# User Manual

## SG8KTL-EC/SG10KTL-EC/ SG12KTL-EC

## PV Grid-Connected Inverter

SG8_10_12KTL-ECV11-UEN-Ver13-201409 Version：1.3

# About This Manual

This manual is for the inverters SG8KTL-EC, SG10KTL-EC, and SG12KTL-EC (hereinafter referred to as the inverter unless specified otherwise). They are grid-connected, transformer-less, robust inverters with high conversion efficiency. The devices will bring you profit for PV power system.

### Aim

The manual contains information about the inverter, which will provide you guidelines to connect the inverter into the PV power system and to operate the inverter.

### Related Documents

The manual cannot include complete information about the PV system. You will get the additional information about other devices at www.sungrowpower.com or via webpage of device manufacturer.

### Target Group

The manual is targeted to technical personnel who is responsible for inverter installation and commissioning in the PV power system and inverter owner who will perform daily LCD operation.

### How to Use This Manual

Read the manual and other related documents before any work on the inverter. Documents must be stored carefully and available at all times.

The contents of the manual will be periodically updated or revised due to product development. It is probably that there are changes of manual in subsequent inverter edition. The latest manual can be acquired via www.sungrowpower.com.

**Symbols Explanation**

Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. And they will be highlighted by the following symbols.

**DANGER**

**DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.**

**WARNING**

**WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.**

**CAUTION**

**CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.**

**NOTICE**

**NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.**

NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

## Symbols on the Inverter Body

| | |
|---|---|
| | Disconnect the inverter from mains and PV generator before service! |
| | Do not touch any inner live parts until 10 minutes after disconnection from the utility grid and the PV input. |
| | Hot surface! In order to reduce the risk of burns, do not touch the hot surface when the device is running. |
| | Look over the user manual before any operation on the inverter! |
| | The installation and service of the inverter unit can only be performed by qualified personnel. |

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# 1 Safety Instructions

**IMPORTANT SAFETY INSTRUCTIONS**

The inverters have been designed and tested strictly according to the international safety regulations. As electrical and electronic equipments, safety instructions related to them must be complied with during installation, commissioning, operation and maintenance. Incorrect operation or work may result in damage to

- the life and well-being of the operator or a third party, or
- the inverter and other properties that belong to the operator or a third party.

Therefore, the following general safety instructions must be read and always kept in mind prior to any work. All detailed work-related safety warnings and notes will be specified at the critical points in corresponding chapter.

**⚠ WARNING**

**All installation and electrical work must be performed only by qualified personnel. They have**

- **been trained specially;**
- **already read through and understood the manual and other related documents;**
- **been familiar with safety requirements for electrical system.**

Technical personnel mentioned above may perform the following work:

- Install the inverter onto the wall.
- Connect the inverter into the PV power system.
- Connect other devices into the PV power system.
- Commission the inverter.
- Maintain and service the inverter.

### Before Installation

**⚠ CAUTION**

**There is a risk of injury due to improperly handling the device!**

- **Always follow the instructions contained in the manual when moving and positioning the inverter.**
- **The weight of the equipment can cause injuries, serious wounds, or bruise if improperly handled.**

**NOTICE**

**The device is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping.**

**If there is visible damage to the packaging or the inner contents, or anything missing, contact the device dealer.**

### During Installation

**⚠ DANGER**

**Prior to installing the inverter onto the wall, it is crucial to make certain that the inverter is not electrically connected.**

**⚠ CAUTION**

**System performance loss due to bad ventilation!**

**The device requires good ventilation during operation. It is essential to keep the device upright and nothing covering the heat sink to ensure that the device interior is well cooled down.**

### During Electrical Connection

**NOTICE**

**All electrical connections must be conducted in accordance with local and national standards.**

**Only with the permission of the local energy sector, the inverter can be connected into the utility grid.**

**DANGER**

**Lethal voltage!**

**PV arrays will produce electrical energy when exposed to sunlight and thus can create an electrical shock hazard.**

- **Wiring of the PV arrays should be performed only by qualified personnel.**
- **PV modules should be covered by opaque materials during wiring.**

**WARNING**

**All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned.**

### During Inverter Operation

Do not open the enclosure when the inverter is under voltage. There is a highly unlikely risk of explosion in very specific cases of fault. The enclosure will protect persons and property from such an explosion, only if it is correctly sealed.

**DANGER**

**There is a risk of inverter damage or personal injury!**

**DO NOT disconnect DC connectors while the inverter is under AC load! First de-energize the device from dual power sources and then verify that there is no voltage present.**

**CAUTION**

**There is a risk of burn!**

**DO NOT touch the device hot parts (such as heat sink) during operation. Only LCD display panel and DC switch can be touched during inverter operation.**

### Maintenance and Service

**DANGER**

**Always keep in mind that the inverter is power supplied by dual power sources: PV arrays and utility grid.**

**There is a risk of inverter damage or personnel injury due to incorrect service work!**

**Before any service work, you should obey the following procedures.**

- **Disconnect inverter from the utility grid first and then PV arrays;**
- **Wait at least 10 minutes until the inner capacitors discharge completely;**
- **Verify that no voltage and current present with appropriate testing device.**

**CAUTION**

**Keep non-related persons away!**

**A temporary warning sign and barrier must be posted to keep non-related persons away for any period while performing electrical connection and service work.**

NOTICE

- **Any fault that may impair the inverter safety functions must be repaired immediately before the inverter is restarted.**
- **Inverter contains no owner serviceable parts inside. Please contact local authorized personnel if any service work is required.**

Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipments or more recent revision of the manual which is clearly and thoroughly understood.

**WARNING**

**Only qualified personnel are allowed to open the top cover!**

**NOTICE**

**There is a risk of inverter damage if it is improperly serviced.**

**Use only accessories and spare parts approved by the inverter manufacturer. Never modify the inverter or its components. Otherwise, it will cause loss of any or all warranty rights.**

**NOTICE**

**There is a risk of inverter damage due to electrostatic discharge!**

**The printed circuit boards contain components sensitive to electrostatic discharge. Wear a grounding wrist band when handling the boards. Avoid unnecessary touch with the boards during replacement.**

**Others**

**NOTICE**

**The selected country settings can be changed only by service personnel!**

**Unauthorized alternation of the country settings is prohibited. Otherwise it may cause a breach of the type-certificate marking.**

**⚠ WARNING**

**All safety instructions, warning labels and nameplate on the inverter body:**

- **Must be clearly visible;**
- **Must not be removed, covered or pasted.**

**NOTICE**

**These regulations should also be followed:**

- **The regulations related to the electricity fed into grid;**
- **The safety instructions related to the PV arrays;**
- **The safety instructions related to other electrical devices.**

# 2 Product Introduction

## 2.1 Intended Usage

The inverters, which are 3-phase string inverters without transformer, are crucial units between the PV strings and utility grid in the small-scaled PV power system.

Inverter is dedicated to converting the DC power generated by the PV modules into AC power, which conforms to the parameters of local utility grid, and feeds the alternating current into the utility grid. The intended usage of the inverter is illustrated in Fig. 2-1.

NOTICE

**Any other or additional usage is not permitted except the intended usage.**

**Where the positive or negative terminal of PV strings needs to be grounded, inverter cannot be connected to PV modules.**

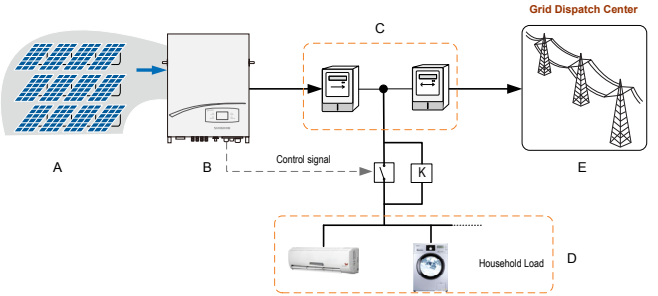



**Fig. 2-1** PV Power System

| Item | Description | Remark |
|---|---|---|
| A | PV strings | Monocrystalline silicon, polycrystalline silicon, and thin-film of protection class II without grounding |
| B | Inverter | SG8KTL-EC, SG10KTL-EC and SG12KTL-EC |
| C | Metering device | Meter cupboard with power distribution system |
| D | Household load | Household appliances |
| E | Utility grid | TT, TN-C, TN-S, TN-C-S |

## 2.2 Product Description

### 2.2.1 Inverter Appearance

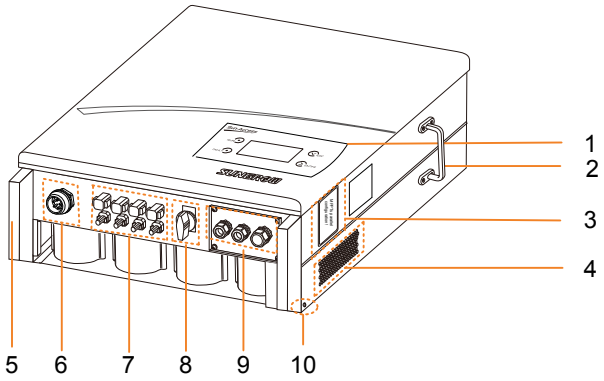



**Fig. 2-2** Inverter Appearance

| No. | Name | Description |
|---|---|---|
| 1 | LCD display panel | Human-computer interaction interface for looking up running information and configuring parameters. |
| 2 | Side grips | The side grips are designed for holding the unit when mounting, moving or servicing the inverter. |
| 3 | PV input parallel lid (**SG12KTL-EC**) | There are two parallel blocks for PV input mode configuration under the lid. |
| 4 | Ventilation holes | Ensure sufficient heat dissipation. |
| 5 | Handles | The handles are designed for transporting, installing and dismantling the inverter. |
| 6 | AC connection terminal | Inverter feeds power to utility grid via this terminal. |
| 7 | DC terminals | There are four pairs of DC terminals for PV input on the bottom of the inverter. |
| 8 | DC switch | During normal operation it is in “ON” position. It can shut down the inverter immediately in “OFF” position. |
| 9 | Communication connection terminals | They are RS485 communication ports, Ethernet communication ports and DI/DO ports. |
| 10 | Second PE terminal | As specified in EN 50178 |

### 2.2.2 Inverter Dimensions

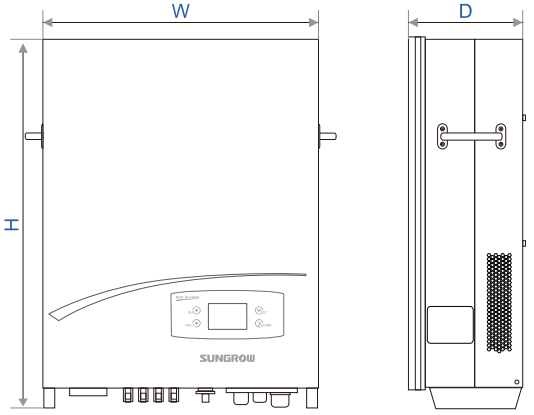



**Fig. 2-3** Outline Dimensions

**Tab. 2-1** Dimension Values

| Type | W(mm) | H(mm) | D(mm) | Net weight(kg) |
|---|---|---|---|---|
| SG8KTL-EC | 535 | 710 | 220 | 36 |
| SG10KTL-EC | 535 | 710 | 220 | 36 |
| SG12KTL-EC | 535 | 710 | 220 | 45 |

### 2.2.3 LCD Display Panel

As a human-computer interaction interface, LCD display panel is on the front panel and comprises LED indicators, buttons and LCD screen.

- LED indicators indicate the working status of the inverter.
- By pressing the buttons user can look up information and configure parameters.
- LCD screen shows the current running information.

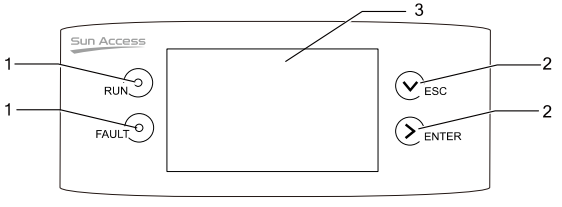



**Fig. 2-4** LCD Display Panel

| No. | Name | Description |
|---|---|---|
| 1 | LED indicators | "RUN" and "FAULT". The current state can be known from the two indicators. Detailed definition is shown in Tab. 2-2. |
| 2 | Buttons | User can operate the LCD menu of the inverter via the two buttons. Detailed function is shown in Tab. 10-1. |
| 3 | LCD Screen | LCD screen can display the current state, current running information, historical information, and parameters to be set. |

**Tab. 2-2** Description of LED Indicators

| Name | State | Description |
|---|---|---|
| "RUN" | On | The inverter is feeding power to the utility grid or in derating operation. |
| | Blinking | The inverter is in the process of startup. |
| | Off | Other states. |
| "FAULT" | On | Communication error, permanent fault, or upgrade failure. |
| | Blinking | Other faults (alarms excluded). |
| | Off | No fault occurs. |

## 2.3 Technical Description

### 2.3.1 Circuit Description

Fig. 2-5 shows the main circuit of inverter.

The boost circuits raise the input DC voltage. Two string MPP trackers can be utilized to ensure the maximum power from PV arrays. Then the inverter circuit converts DC power to AC power. Three-level inverter circuit converts the DC power into AC power, which will be fed into the utility grid via AC terminal. Meanwhile inverter is equipped with protective circuit to guarantee its safety operation which can trigger the AC relay if required.

Additionally, a DC switch is integrated for safe disconnection of DC current. The inverter provides RS485 ports and NET ports for communication. Users can look up running data and set parameters through LCD display panel.

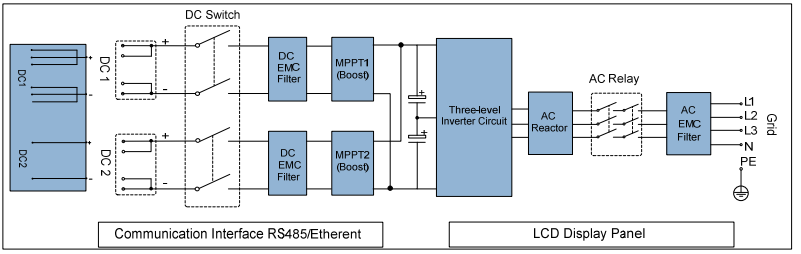



**Fig. 2-5** Main Circuit Diagram of Inverter

## 2.3.2 Functions Description

Inverter functions can be grouped as the following:

- Conversion function

  Inverter converts the DC power into the AC power, which conforms to the grid requirements of its installation country.

- Data storage and display

  Inverter archives essential data including running information and fault records, and displays them on the integrated LCD display.

- Parameters configuration

  Inverter provides various parameters configuration for optimal operation.

- Communication interface

  RS485 serial communication with RJ45 ports (RS485-1 and RS485-2) and Ethernet communication with RJ45 ports (Net-1 and Net-2).

- Protection functions include:
  - Reverse polarity protection
  - Short circuit protection
  - Insulation resistance detection
  - Inverter output voltage monitoring
  - Inverter output frequency monitoring
  - Residual current monitoring
  - DC injection of AC output current surveillance
  - Anti-islanding protection
  - DC over-voltage protection
  - DC Over-current protection
  - Power module over-temperature protection

# 3 Unpacking and Storing

## 3.1 Unpacking and Inspecting

The device is thoroughly tested and inspected before delivery. Although sturdy packaging is used, damage may still occur during shipping.

If there is visible damage to the packaging or the inner contents, or anything missing, contact the device dealer.

Do not dispose of the original packaging. It is the best choice to store the inverter in the original packaging.

During unpacking, cut the green plastic straps and lift the full upper-part of the carton box. Do not cut the sticky tape.

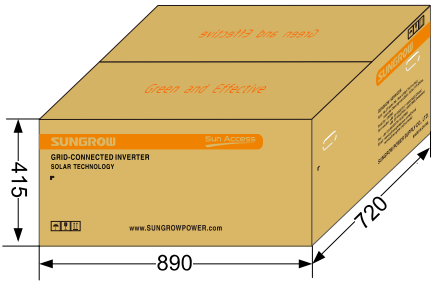



**Fig. 3-1** Single Inverter in Original Packaging Carton(unit: mm)

## 3.2 Moving the Inverter

In order to avoid damage to the inverter during moving, it is better to move inverter in the original carton.

Pay attention to the weight. Proper device that can bear the weight is needed to avoid inverter damage or person injury when moving.

NOTICE

**When moving the inverter, please follow the symbol instructions on the packaging box.**

## 3.3 Identifying Inverter

Two nameplates are attached to the side of the inverter and the carton respectively. They provide information about the inverter type, the most important specifications, marks of certification institutions, website and serial number which are available and identified by SUNGROW.

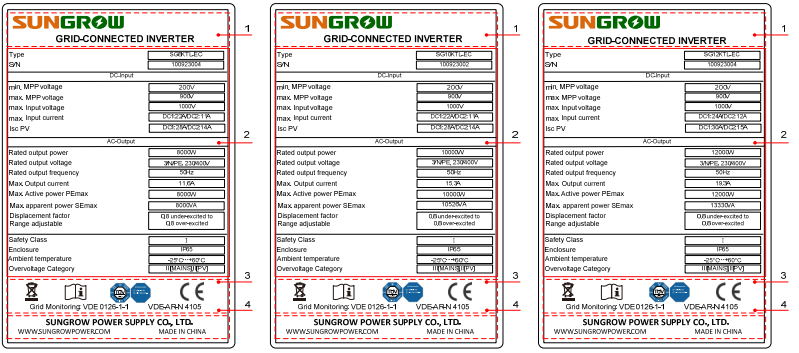



**Fig. 3-2** Nameplates of Inverters

*Image shown here is for reference only. Actual product you receive may differ.

| Item | Description | Item | Description |
|---|---|---|---|
| 1 | SUNGROW logo and product type | 3 | Marks of certification institutions |
| 2 | Technical data | 4 | Company name, website and origin |

**Tab. 3-1** Description of Icons on the Nameplate

| Icon | Description |
|---|---|
| | Do not dispose of the inverter with the household waste. |
| | Refer to the corresponding instructions. |
| | TUV mark of conformity.<br>The inverter is in compliance with directives of TUV. |
| | CE mark of conformity.<br>The inverter is in compliance with directives of CE. |

## 3.4 Delivery Contents

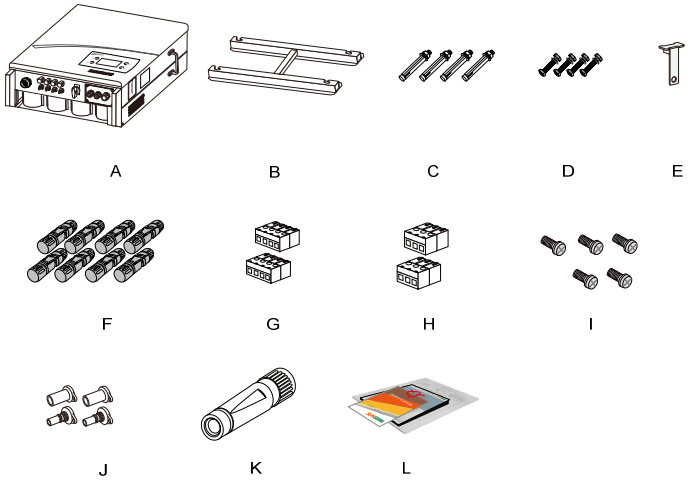



**Fig. 3-3** Delivery Contents

*Image shown here is for reference only. Actual product you receive may differ.

| Item | Description |
|---|---|
| A | Inverter. |
| B | Wall bracket used to mount inverter onto the wall. |
| C | Expansion bolts for fastening wall bracket onto concrete wall. |
| D | Fastener set for installing wall bracket onto metal frame. |
| E | Theft-proof device used to lock the inverter to the wall bracket. |
| F | PV input connectors, including positive and negative connectors. |
| G | Four-pole plugs for DI connection. |
| H | Three-pole plugs for DO connection. |
| I | Five M4 screws for second PE connection and spare. |
| J | Two pairs. Seal the unplugged PV connectors with sealing caps. |
| K | AC connector. |
| L | Related documents, including quality certificates, quick user manual, CD, packing list and product test reports. |

## 3.5 Storing the Inverter

If you do not install the inverter immediately, choose an appropriate location to store it.

- The device must be stored in original packaging and the desiccant must be left in the packaging.
- The device must be stored in a clean and dry place to protect against dust and moisture.
- The storage temperature should be always between -30°C and +70°C. And the storage relative humidity should be always between 0 and 95%.
- It is very important to keep the packing away from chemicals. Otherwise it will lead to corrosion.
- During the storage time, check periodically for visible damages by rodents. Replace the packaging if necessary.
- If there is more than one inverter to be stored, the maximum layers for original paper packaging are three.
- After long-term storage, local installer or Service Dept. of SUNGROW should perform a comprehensive test before connecting the inverter into PV power system.

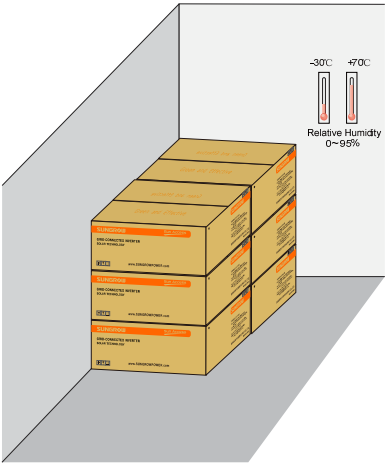



**Fig. 3-4** Example for Inverter Storage

# 4 Securing Inverter to the Wall

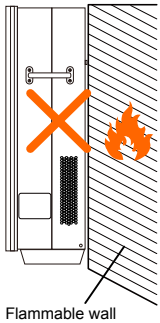
## 4.1 Selecting Installation Location

Selecting an optimal installation location for the inverter is decisive for its operating safety as well as its expected efficiency and service life.

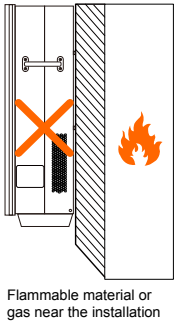
1. Take the load capacity of the wall into account. The wall (such as concrete wall and metal structure) should be strong enough to hold the weight of the inverter over a long period.

2. Install the device where is accessible for installing, electrical connection or service.

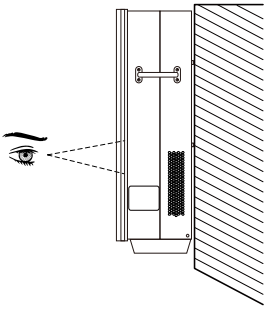
3. Do not install the unit on wall of flammable materials.



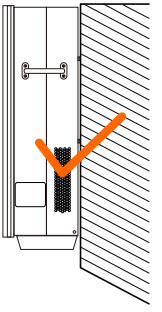

4. Do not install the inverter where contains flammable materials or flammable gas in the vicinity of the installation site.



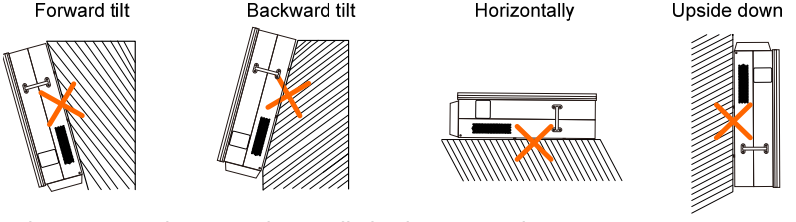
5. Install the device at eye level for easy buttons operation and display reading.



6. It is suggested that the inverter be installed vertically with upside up for good heat dissipation.



7. Never install the inverter horizontally, or with a forward tilt or with a backward tilt or even with upside down.




8. The inverter with IP65 can be installed indoors or outdoors.

9. The ambient temperature should range from -25°C to 60°C. The power output will reduce when the ambient temperature exceeds 45°C.

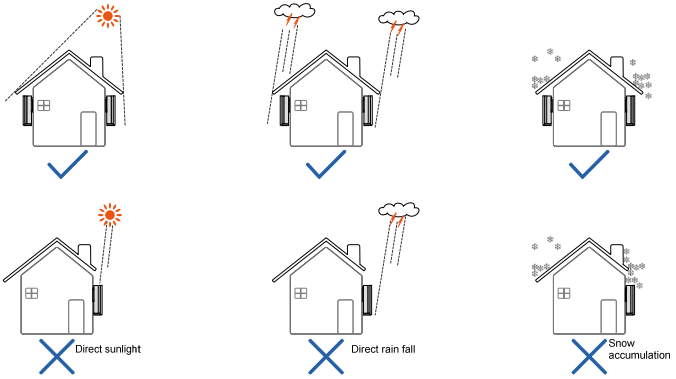
Max. ambient temperature: +60°C

Min. ambient temperature: -25°C

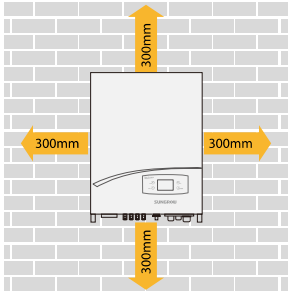
10. The maximum relative humidity of chosen installation site can reach 95%.

Max. relative humidity: +95% No condensing

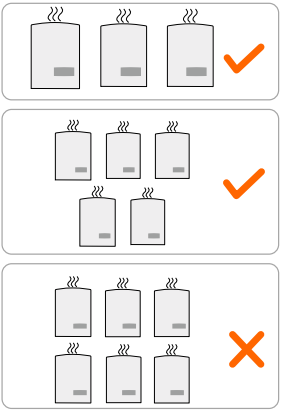
11. Avoid exposing the inverter to direct sunlight, rain or snow to extend its service life despite of IP65 rating. Shaded site of the building would be better.



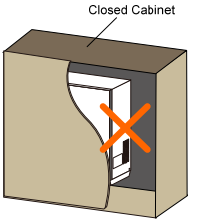

12. Take enough space for convection into consideration during installation.



13. For multiple inverters installation, position the inverters side by side. For multi-row inverters installation, position the inverters in a staggered arrangement.



14. Do not install the inverter in an enclosed space. Otherwise, the inverter will not operate normally.




15. Do not install inverter where children can reach.

16. Do not install the inverter in residential area. Noise can be produced during the inverter running and may affect your daily life.

## 4.2 Moving Inverter to Installation Site

If the inverter is to be installed, remove the device from the packaging and move it to the chosen installation site. During the moving process, the instructions below should be obeyed.

1. Beware of the weight of the inverter.
2. Grasp the equipment with both hands by means of the side grips.
3. Move the inverter with the help of another person or the lifting device.
4. Do not release the equipment unless it has been firmly secured to the wall.

## 4.3 Installing the Inverter

Inverter is installed onto the wall by means of wall bracket in the packaging.

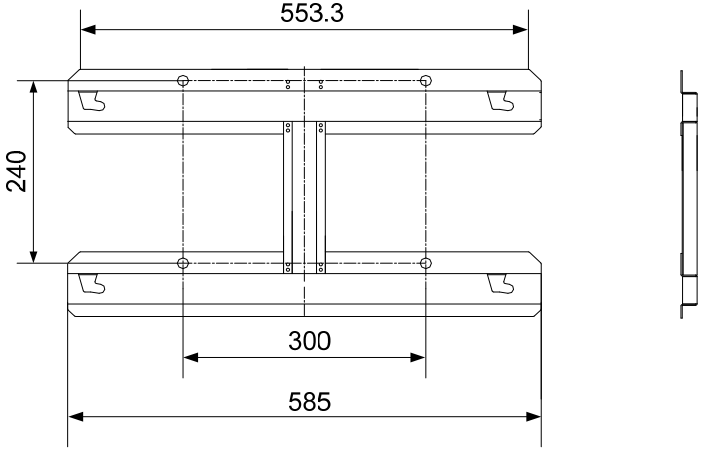



**Fig. 4-1** Dimensions of wall bracket(unit: mm)

There are two sets of stainless fasteners supplied to attach the wall bracket to the concrete wall and metal frame respectively.

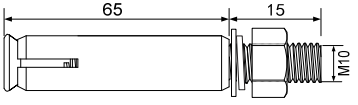



**Fig. 4-2** Dimensions of Expansion Bolt Set for Concrete Wall(unit: mm)

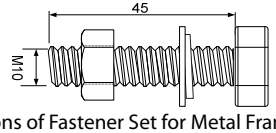



**Fig. 4-3** Dimensions of Fastener Set for Metal Frame(unit: mm)

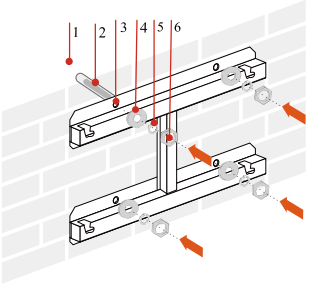
**For Concrete Wall**

1. Remove wall bracket and fasteners from the packaging.
2. Place the wall bracket onto the chosen concrete wall and adjust it until it is in a horizontal position.
3. Mark the positions to drill holes using the wall bracket as the template.
4. Drill holes according to the marks you have made.

**DANGER**

**In order to avoid electrical shock or other injury, inspect if there is electricity or plumbing installations before drilling holes.**

5. Attach the wall bracket to the wall with the supplied expansion bolt set. The torque for fastening the nut should be at least 35 N·m.



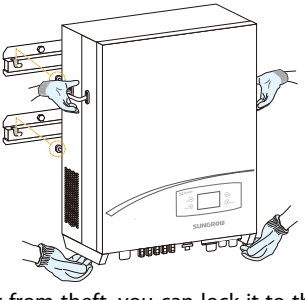

| No. | Description |
|---|---|
| 1 | Concrete wall |
| 2 | Expansion cylinder (M10x80) |
| 3 | Wall bracket |
| 4 | Washer |
| 5 | Spring washer |
| 6 | Hexagonal socket nut |

**Fig. 4-4** Fasten the Wall bracket against Concrete Wall

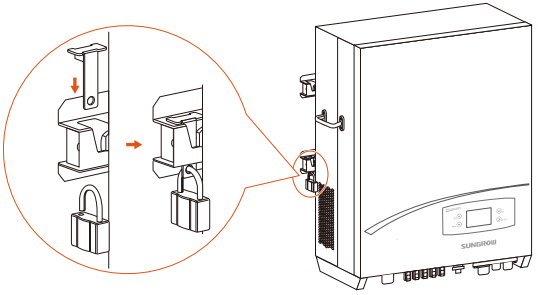
6. Lift up the inverter above the wall bracket with the help of other people and then slide down. Make sure that the lag screws on the back of the inverter and grooves on the wall bracket engage perfectly.

NOTICE

**The Installers must wear gloves to avoid scratches when mounting the inverter.**



7. To protect the inverter from theft, you can lock it to the wall bracket with a theft-proof device and a padlock.



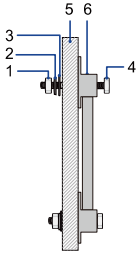
### On Metal Frame

If the chosen mounting location is metal frame, please proceed as follows to mount the inverter.

1. Remove the supplied wall bracket from the packaging.
2. Choose the best installation site according to above requirements. Place the wall bracket onto the chosen metal frame and adjust it until it is in a horizontal position.
3. Mark the positions to drill holes by using the wall bracket as the template.
4. Drill holes according to the marks you have made.

> If the shape of the metal frame does not fit the holes on the wall bracket, you need to re-drill holes on the wall bracket at appropriate position according to the chosen frame.

5. Fasten the wall bracket against the metal frame with bolts and nuts. The dimensions of fasteners used in the following diagram are recommended. The torque for fastening the nut is 35 N·m.



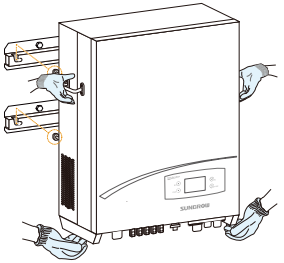

| No. | Description | Remark |
|---|---|---|
| 1 | Hexagonal socket nut | M10 |
| 2 | Spring washer | ------ |
| 3 | Washer | ------ |
| 4 | Hexagonal bolt | M10x45 |
| 5 | Metallic wall | ------ |
| 6 | Wall bracket | ------ |

**Fig. 4-5** Fasten Wall bracket against Metal Frame

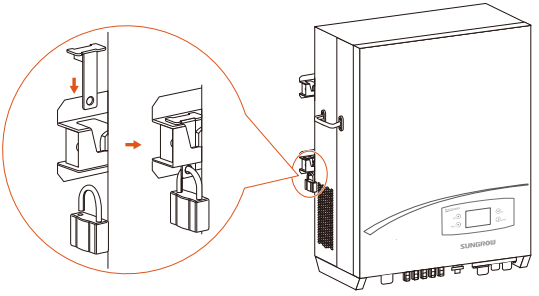
6. Lift up the inverter above the wall bracket with the help of other people and then slide down. Make sure that the lag screws on the back of the inverter and grooves on the wall bracket engage perfectly.

NOTICE

**The Installers must wear gloves to avoid scratches when mounting the inverter.**



7. To protect the inverter from theft, you can lock it to the wall bracket with a theft-proof device and a padlock.



# 5 Electrical Connection

Once the inverter is firmly attached to the appropriate location, it can be connected into the PV power system.

**⚠ WARNING**

**Improper operation during the wiring process can cause fatal injury to operators or unrecoverable damages to the inverter.**

**Only qualified personnel can perform the wiring work.**

Prior to any electrical connection, keep in mind that the inverter has dual power supplies. It is mandatory for technical personnel to wear personal protective equipments during the electrical work: helmet, footwear and gloves.

## 5.1 Overview of Electrical Connection

Connecting inverter to the existing PV system includes connecting inverter to local grid and connecting inverter to PV arrays. There may be communication connection for monitoring if necessary.

All electrical connections should follow the National Wiring Rules of Standard AS/NZS 3000. The requirements in AS 4777.1 and AS/NZS 3000 indicate that a DC isolator must be used before the inverter.

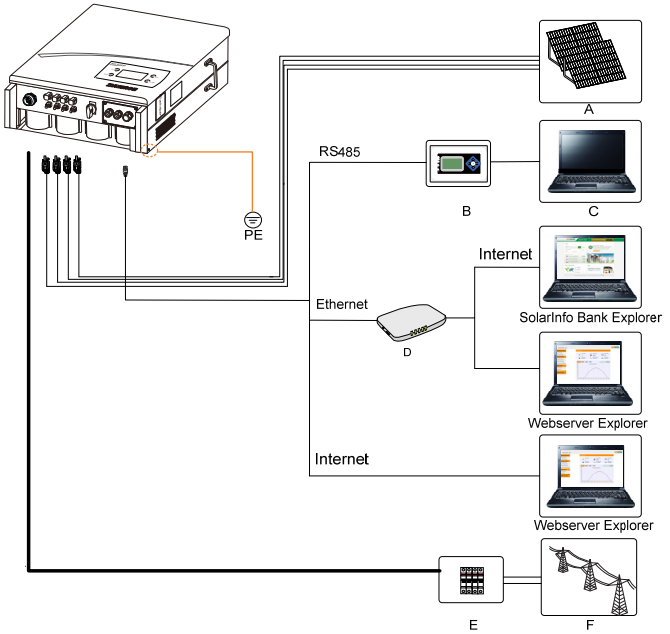



**Fig. 5-1** Electrical Connection Diagram

| Item | Description | Remark |
|---|---|---|
| A | PV arrays | The maximum open-circuit voltage of each PV string is 1000 V. |
| B | SolarInfo logger | It can be ordered from SUNGROW. Or use compatible logger from Meteo-Control, Solar-Log or Papendorf SE |
| C | Remote PC | User uses this device to monitor the whole PV system. |
| D | Router/Switch | Used as data transferring device between inverter and the Internet/Webserver, to monitor the whole PV system |
| E | AC circuit breaker | Used as a protective device during electrical connection. User equips this device according to the maximum output voltage and current. |
| F | Utility Grid | Rated AC voltage is 230 V. |

## 5.2 Terminals Description

All electrical terminals are located at the bottom of the inverter. Fig. 5-2 shows the connection area.

Enough space around the inverter should be kept for electrical connection when choosing the installation site.

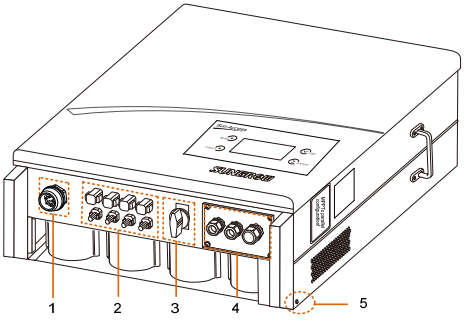



**Fig. 5-2** Terminals Description

| Item | Description |
|---|---|
| 1 | AC connector: Amphenol C16_L |
| 2 | DC1/DC2: DC connectors, MC4 |
| 3 | Integrated DC switch |
| 4 | Communication waterproof connectors |
| 5 | Second PE Terminal |

## 5.3 Connecting Inverter to Grid

### 5.3.1 AC Side Requirements

Only after receiving prior approval from the local grid company as required, should you connect the inverter to the grid.

NOTICE

**The grid should meet the following requirements. Otherwise the inverter will not work.**

- **Grid Voltage** **180~276V**
- **Grid Frequency** **45~55Hz**

### AC Side Circuit Breaker

An independent three or four-pole circuit breaker for the inverter must be installed at the output side to ensure that the inverter can be securely disconnected under load.

| Inverter Type | Specification for AC Circuit Breaker |
|---|---|
| SG8KTL-EC | 30A |
| SG10KTL-EC | 30A |
| SG12KTL-EC | 32A |

NOTICE

- **It is not allowed for several inverters to use the same circuit breaker.**
- **It is not allowed to connect loads between the inverter and circuit breaker.**

### Residual Current Device

With an integrated universal current-sensitive residual current monitoring unit inside, the inverter is able to distinguish the fault currents from normal capacitive leakage currents. The inverter will disconnect from mains as soon as a fault current with value exceeding the limit has been detected.

However if an external RCD or residual current breaker is mandatory, the switch must be triggered at a failure current of 300 mA or higher.

### Requirements of Multiple Inverters in Parallel Grid Connection

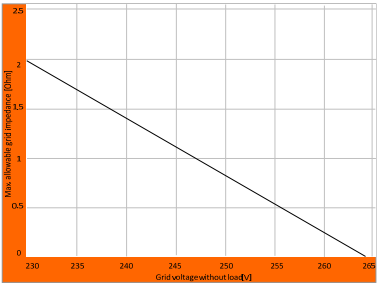
If several inverters are operated in parallel connection to grid, different requirements should be obeyed (See technical information "***Technical notes for multiple-paralleled grid-connected inverters***" in the download area of SUNGROW website).

### AC Cable Requirements

The grid is connected to the inverter via 5 wires (L1, L2, L3, N and PE). Feed-in power is always three-phase via AC terminal at the bottom of the device.

Consider the following facts when selecting AC cables specifications and types:

- The grid impedance of the AC cable must correspond to the specification to avoid unintended disconnection from the grid or derating of the output power.




- The maximum length of the cables depends on the cable cross-section area, as shown in the following table. Note that the power loss of the cables should be within 1% of the nominal power.

| Type | Single Conductor Cross Section | | Total Outer cable diameters | | Maximum Cable Length |
|---|---|---|---|---|---|
| | Range | Recommended | Range | Recommended | |
| SG8KTL-EC/ SG10KTL-EC/ SG12KTL-EC | 4…10 $mm^2$ (AWG11…AWG7) | 4…10 $mm^2$ (AWG11…AWG7) | 11…20 mm | 15 mm | 100 m |

- Withstand ambient temperature;
- Layout type (inside wall, underground, free air etc.);
- UV resistance and so on.

### 5.3.2 Assembling AC Cables to Connector

The inverter is equipped with water-proof connector for AC connection, which matches with the AC terminal at the bottom of the inverter.

**DANGER**

**Danger to human life due to high voltage inside the inverter!**

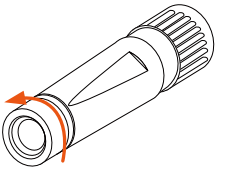
- **Make sure that all the AC cables to the inverter are not live before the electrical work.**
- **Do not turn on the AC circuit breaker until all electrical connections are completed.**

Prior to connecting to the utility grid, verify whether the grid voltage and frequency are within the range of inverter output parameters, referred to "**12 Appendix**". Consult local grid company for solution, if otherwise.

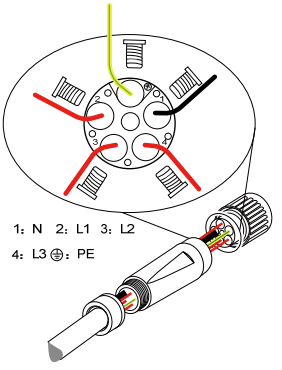
All AC cables should be equipped with correctly colored cables for distinguishing. Please refer to related standards about wiring color.

**AC Wiring Procedure**

1. Unscrew the water-proof terminal in the following direction.



2. Insert appropriate size AC cables into the water-proof terminal.
3. Strip off insulation layer of all AC cables. The length of strip insulation is approximately 10 mm.
4. Fix all cables ends to the corresponding terminals with the torque of 1 N·m according to markings on the connector, especially "PE" cable. If a phase wire is connected to the "PE" terminal, it may permanently destroy the inverter.




5. Pull cables outwards to confirm whether they are installed firmly.
6. Combine the two front-end parts together with the torque of 2 N·m.
7. Tighten the water-proof terminal with the torque of 5 N·m in opposite direction.
8. Make sure the AC and DC circuit breakers are disconnected.
9. Connect phase cables and "N" cable to AC circuit breaker.
   - Plug AC connector to corresponding AC terminal.
   - Screw AC cables except the "PE" cable to the AC circuit breaker.
10. Connect AC circuit breaker to the utility grid.
11. Make sure all AC cables are firmly installed.

## 5.4 Connecting Inverter to PV Arrays

**DANGER**

**Lethal voltage exists!**

**PV arrays produce electrical energy when exposed to light and thus can create an electrical shock hazard. Cover the PV arrays with opaque materials and then perform the wiring. Wiring should be performed only by qualified personnel.**

**NOTICE**

**Make sure that the maximum parasitic capacitance of the inverter is less than (0.12 uf/kW) * 8 kW/10 kW/12 kW, otherwise the inverter will not function properly.**

**WARNING**

**Before connecting the PV arrays to the inverter, make sure that the impedances between the positive terminal of the PV string and Earth and the impedances between the negative terminal of the PV string and Earth are larger than 200 Kohm.**

**NOTICE**

**There is a risk of inverter damage! The following requirements should be met, otherwise they will lead to loss of any or all warranty rights.**

- **Make sure that the maximum short circuit current of each DC input is less than the inverter allowable limit.**
- **Make sure that the maximum open voltage of each string is less than 1000 V. Voltage over 1000 V can damage the inverter.**

If the input line is changed, such as input line falls off, panels configuration modified, etc. You need to reset the work mode.

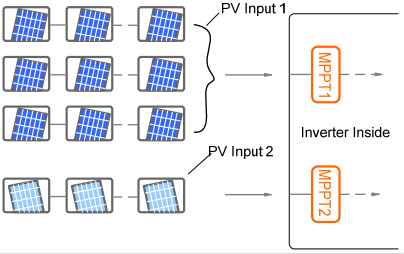
### 5.4.1 PV Inputs Configuration

The inverter has two PV input areas DC1 input and DC2 input, each with its MPP tracker. The two PV inputs can be configured in independent mode or parallel mode.

#### PV Configuration Mode-Independent Mode

For independent mode, the two PV inputs work independently, each with its own MPPT. Therefore the two PV inputs can be different from each other in PV module types, numbers of PV panels in PV strings, tilt angles and orientation angles of PV modules.

As shown in the following figure, the inverter should be configured to independent mode due to different orientation angles between the two PV inputs.




To make sure the maximum DC power, PV strings connected to individual input area should have a homogenous structure, i.e. the same type, the same number, the same identical tilt and identical orientation.

Prior to connecting inverter to PV inputs, the following specifications should be met:

| Type | Area | DC Power Limit for Total Input | Open-circuit Voltage Limit for Each Input | Short-circuit Current Limit for Each Input |
|---|---|---|---|---|
| SG8KTL-EC | DC1 | 8440 W | 1000 V | 28 A |
| | DC2 | | | 14 A |
| SG10KTL-EC | DC1 | 10550 W | 1000 V | 28 A |
| | DC2 | | | 14 A |
| SG12KTL-EC | DC1 | 12650 W | 1000 V | 30 A |
| | DC2 | | | 15 A |

NOTICE

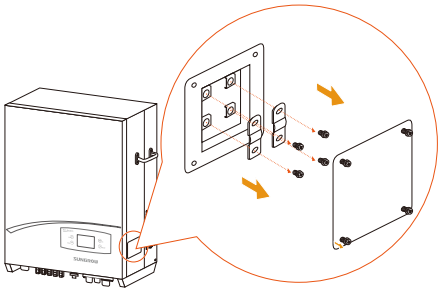
**In independent mode, when there is only one PV input, the other input may produce induced voltage. DO NOT touch the unused DC terminals.**

### Configuration of Independent Mode for SG12KTL-EC

The inverter is set in parallel mode by default.

If you want to configure it to independent mode, please remove the copper bars between the two terminal blocks and tighten the screws.

Keep the copper bars in a convenient place for future use.

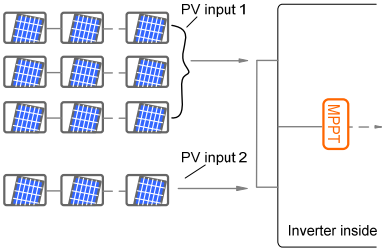


Tighten the PV input parallel lid to the inverter with all 4 fasten screws.

### PV Configuration Mode-Parallel Mode

For parallel mode, all PV strings with the same type, the same number of PV panels, identical tilt and identical orientation in series can be connected to the same single input area. Two trackers are configured in parallel by Y-type cable connector terminal to handle power and/or current levels higher than those a single tracker can handle.

As shown in the following figure, the inverter may choose parallel mode since there is no difference between the two PV inputs. For SG8KTL-EC and SG10KTL-EC, the terminals in DC1 input and DC2 input must be short-circuited by Y-type cable connector.




Prior to connecting the inverter to PV inputs, the following electrical specifications must be met simultaneously:

| Type | Total DC Power Limit for Inverter | Open-circuit Voltage Limit for Each Input | Short-circuit Current Limit for Total Input |
|---|---|---|---|
| SG8KTL-EC | 8440 W | 1000 V | 42 A |
| SG10KTL-EC | 10550 W | 1000 V | 42 A |
| SG12KTL-EC | 12650 W | 1000 V | 45 A |

### Configuration of Parallel Mode for SG12KTL-EC

The inverter is set in parallel mode by default.

The default configuration mode of the LCD screen is parallel mode. If you want to configure it to independent mode, please refer to"**10.14 Setting PV Configuration Mode** ".

### 5.4.2 Assembling DC Cable to Connector

All DC cables are equipped with water-proof direct plug-in connectors, which match with the DC terminals at the bottom of the inverter.

The positive and negative connectors are marked with polarity symbols and should be equipped with correctly colored cables.

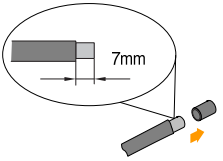
e.g. Red cable should be connected to DC positive terminal while the blue one should be connected to the negative.

**DC Cable Requirements**

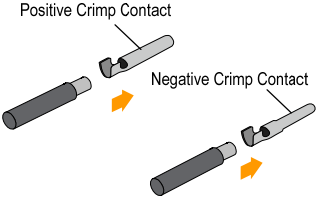
| Type | Cross-Section Area Range | Outer Cable Diameters | Max. Withstand Voltage | Max. Withstand Current |
|---|---|---|---|---|
| SG8KTL-EC | 4...6 $mm^2$ 11AWG-9AWG | 6…9 mm | 1000 V | Same with short-circuit current. |
| SG10KTL-EC | 4...6 $mm^2$ 11AWG-9AWG | 6…9 mm | 1000 V | Same with short-circuit current. |
| SG12KTL-EC | 4...6 $mm^2$ 11AWG-9AWG | 6…9 mm | 1000 V | Same with short-circuit current. |

**DC Connector Assembling Procedure**

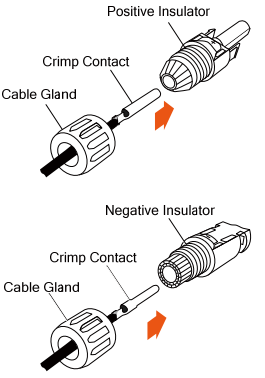
1. Strip off 7 mm insulation layer from all DC cables.




2. Assemble cable ends with crimp contacts by crimping pliers.



3. Lead cable through the cable gland.
4. Insert the crimp contact into the insulator until it snaps into place. Then pull gently to check if it is correctly engaged.
5. Screw the cable gland to the front insulator with tightening torque 2.5…3 N·m.




For further assembly and connection instruction, please visit the webpage of the device manufacturer.

### 5.4.3 DC Wiring Procedure

**DANGER**

**Make sure that none of the DC or AC cables connected to the inverter is live before the electrical work.**

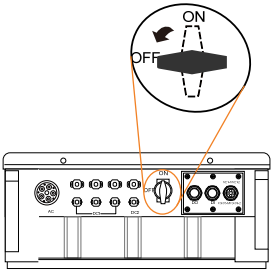
NOTICE

**Make sure that the open circuit voltage does not exceed inverter input limit of 1000 V, even under the lowest operating temperature.**

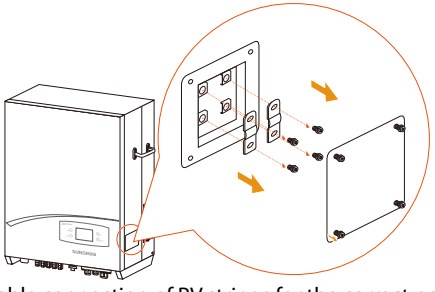
**PV Connection of Independent Mode**

Connect the inverter to PV arrays according to the following procedures:

1. Rotate the DC switch at the bottom to the "OFF" position.




2. Remove the copper bars between the two terminal blocks before any PV string connection.**(For SG12KTL-EC)**



3. Check the cable connection of PV strings for the correct polarity.

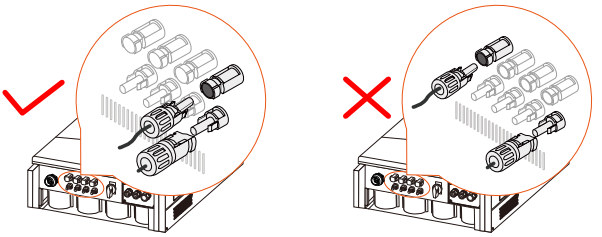
NOTICE

**The inverter will not function properly if the DC polarities are reversed.**

4. Plug the positive and negative DC connectors into corresponding terminals until there is an audible click.

NOTICE

**Connect the same PV string to terminals of the same input areas. For example, connect the positive pole of a string to DC1+ and the negative pole to the DC1-.**



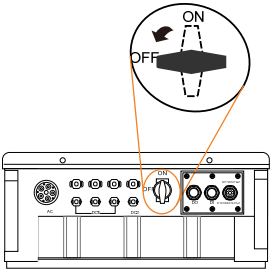
* Image shown here is for reference only. Actual product you receive may differ.

5. Connect other PV strings as the same procedures if necessary. Seal unused DC terminals with the terminal caps.

### PV Connection of Parallel Mode

Connect the inverter to PV arrays according to the following procedures:

1. Rotate the DC switch at the inverter bottom to the "OFF" position.




2. Check the cable connection of PV strings for the correct polarity.
3. Plug the positive and negative DC connectors into corresponding terminals until it click-locks into place.
4. One pair of DC terminals in DC1 input and DC2 input must be short-circuited by Y-type cable connector terminal. **(For SG8KTL-EC and SG10KTL-EC)**
5. Connect other PV strings in the same procedures if necessary. Unused DC terminals should be sealed with the terminal caps.

## 5.5 Grounding the Inverter

**WARNING**

**Because of the transform-less design of the inverter, DC positive pole and DC negative pole are not permitted to be grounded. A permanent destroy to the inverter may follow if otherwise.**

### 5.5.1 Grounding System Overview

All non-current carrying exposed metal parts of the equipment and other enclosures in the PV power system should be grounded (e.g., PV arrays frame and inverter enclosure).

Where there is only one inverter in the PV power system, connect the "PE" cable to the installation ground.

Where there are multiple inverters in the PV power system, connect the "PE" cables of all inverters and mounting frame of PV arrays to the same copper bus bar. In this way, they are in equipotential connection.

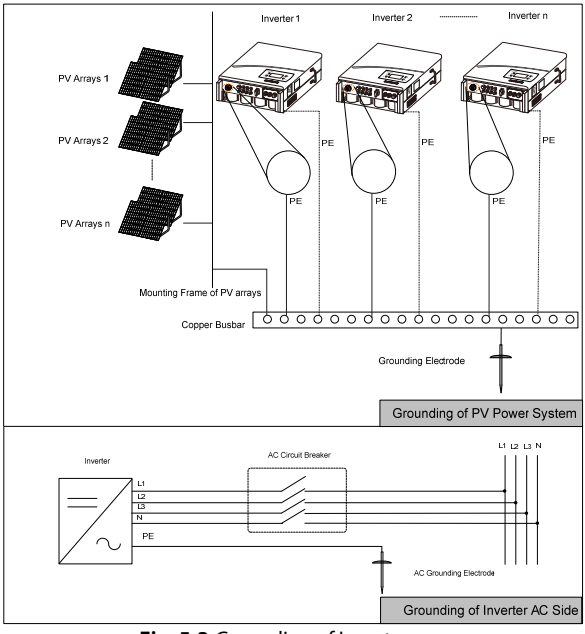



**Fig. 5-3** Grounding of Inverter

## 5.5.2 Second Protective Earth Terminal

The inverters are equipped with second protective earth terminal as specified in EN 50178.

### Second PE Terminal

There is a PE terminal on the right side of the inverter. You may choose to connect the PE.

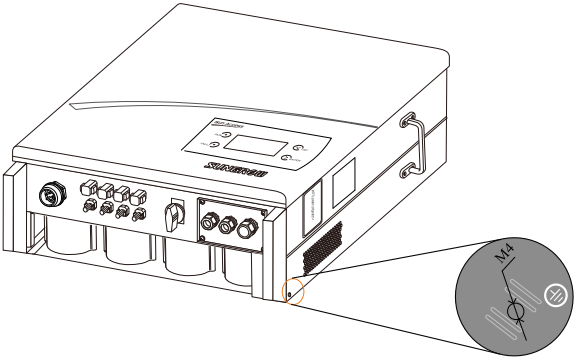
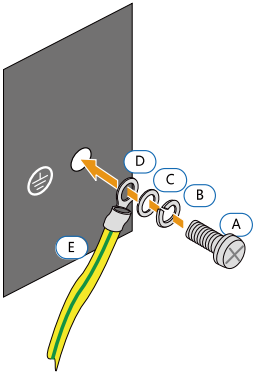



**Fig. 5-4** Second PE Terminal

### Second PE Connection




| Item | Description | Specification |
|---|---|---|
| A | Screw | M4×12 mm |
| B | Spring washer | - |
| C | Washer | - |
| D | Cable socket | - |
| E | Yellow-green cable | 6 $mm^2$-10$mm^2$ copper wire or 10 $mm^2$-16$mm^2$ aluminum wire |

**Fig. 5-5** Connection of the Second PE Connection

## 5.6 Communication Connection

### 5.6.1 Interfaces Overview

All communication terminals are located on the bottom of the inverter.

There are two kinds of optional connection ports on the communication circuit board: RS485 serial communication with RJ45 ports (RS485-1/2) and Ethernet communication with RJ45 ports (NET-1/2).

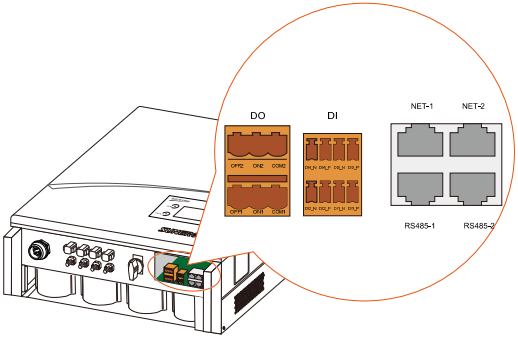



**Fig. 5-6** Communication Terminals

- For RS485 serial communication, the inverter operation information can be transferred via RS485 ports to a PC with query software, or to data logging device (such as MC Logger).
- For Ethernet communication, the inverter operation information can be transferred via NET ports to a PC with query software, or Webserver, or to SolarInfo Bank via the router.

Before communication connection, prepare communication cables and RJ45 plug.

NOTICE

**Cable requirements to ensure quality of communication:**

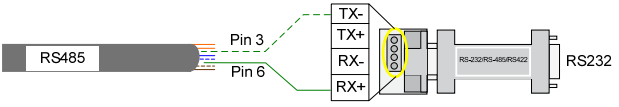
- **Shielded network cable**
- **DI and DO connection cable**

A converter such as RS485-232 converter or SolarInfo Logger, which converts 485 signal to 232 signal, is needed between the inverter and PC.

### 5.6.2 RS485 Communication Connection

If the communication system is equipped with SolarInfo Logger, inverters may be remotely monitored via SolarInfo Bank.

SolarInfo logger and RS485-232 converter are optional parts and can be ordered from SUNGROW.




**For Single Inverter**

Where there is only one inverter, Network cable with RJ45 plugs enables connection between the inverter and PC.

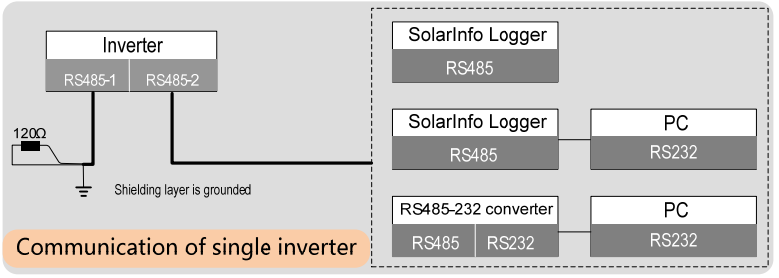



**Fig. 5-7** Single inverter RS485 communication connection

**For Multiple Inverters**

Where there is more than one inverter, all inverters can be connected in a "daisy chain". The very first and last inverters in the chain must be terminated with a resistor of 120Ω. The shielding layer of network cable should be single-point grounded.

The maximum number of inverters connected in the daisy chain depends on converter, data logging device and other factors. Please refer to converter's or data logging device's manual to obtain the limit.

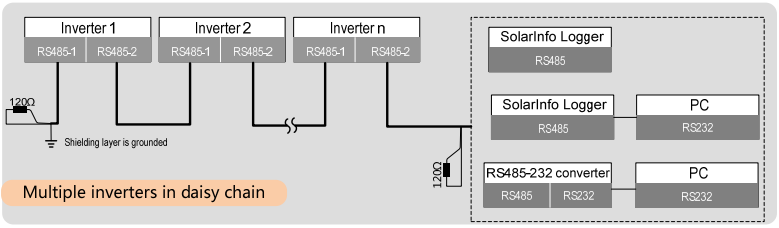
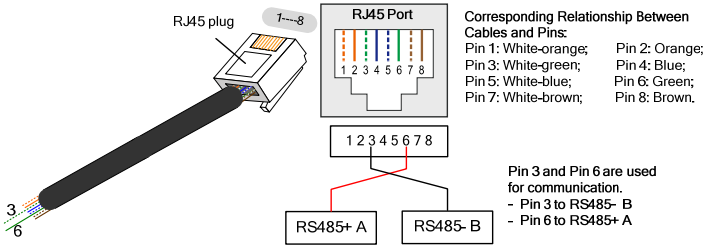


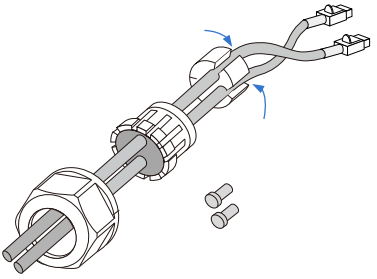

**Fig. 5-8** Multiple inverters RS485 communication connection

## RS485 Connection Procedure

1. Loosen all 6 fasten screws on the communication terminal lid and remove the lid.
2. Unscrew Thread-Lock Sealing Nut, pull out the Waterproof Sealing Insert from the port.
3. Lead the network cables through the Thread-Lock Sealing Nut, and the cable gland.
4. Remove the Clamping Claw and two Sealing Plugs from the Waterproof Sealing Insert.
5. Use the Ethernet crimper to crimp the cables and connect cables to RJ45 plugs according to TIA/EIA 568B.




6. Insert the network cables into the Waterproof Sealing Insert. Connect the RJ45 plugs to the RS485 ports on the communication configuration circuit coard until it makes a clicking sound.



7. Push the Waterproof Sealing Insert into the cable gland and make sure that all unused cable openings are sealed with dustproof plugs.
8. According to the position of the inverter, repeat step 6 to connect the other network cables to the RS485-1 /RS485-2. Network cables with RJ45 plugs can be directly used to connect between the inverters and form a communication daisy chain.
9. Pull cables outwards to confirm whether they are fastened firmly.
10. As for the wires which connect to the terminating resistor or logging devices, use a Network cable crimping plier to strip the insulation layer and connect the RS485 A and B cables (6 and 3) to terminating resistor or data logging device or RS 485-232 converter.
11. Connect the other devices. Refer to the device manual for the definition of the communication port.
12. Verify the communication connection and configure the communication parameters.

If there is more than one inverter to communicate with a PC or a data logger, it is crucial to configure the communication parameters of each inverter. See "**10.13 Setting Communication Parameters** ".

13. If you don't need to connect other cables, fix all fasten screws to the communication terminal lid, push the Waterproof Sealing Insert back to communication ports and tighten the Thread-Lock Sealing Nut firmly to the cable gland.

### 5.6.3 Ethernet Communication Connection

You can connect the inverter to PC through NET ports to set up Ethernet communication. Network cable with RJ45 plugs enables connection between the inverter and PC.

The Ethernet communication can be connected either in single, daisy chain or star topology.

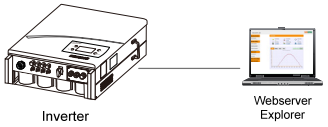



**Fig. 5-9** Direct network connection of single inverter

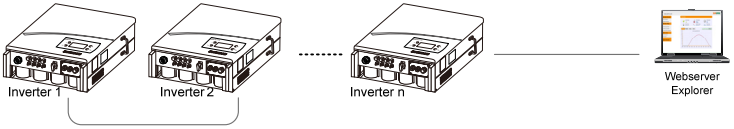



**Fig. 5-10** Direct network connection of inverters

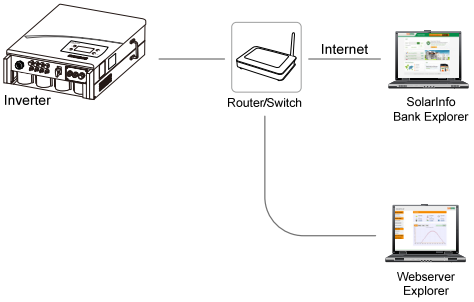



**Fig. 5-11** Single inverter network connection

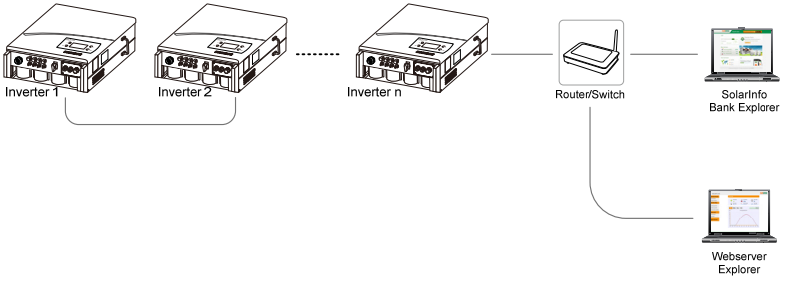



**Fig. 5-12** Inverters network connection in daisy chain topology

The network communication of the daisy chain is done via the inverter in-built switching chip. Therefore, when the inverter is damaged or enters the low power consumption status, the switching chip cannot work normally and the daisy chain communication will be interrupted.

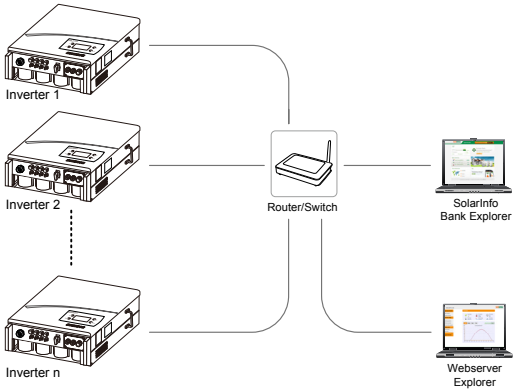



**Fig. 5-13** Inverters network connection in star topology

**The star topology network connection is recommended for optimal operation.**

The maximum number of inverters connected depends on switch, router and other factors. Please refer to switch's or router's manual to obtain the limit.

The Network cable should be less than 100 m.

By logging into the Webserver explorer you can view and set the operation parameters of a single inverter. Please refer to **"6 Visiting and Configuring the Webserver"** for detailed operation of the Webserver.

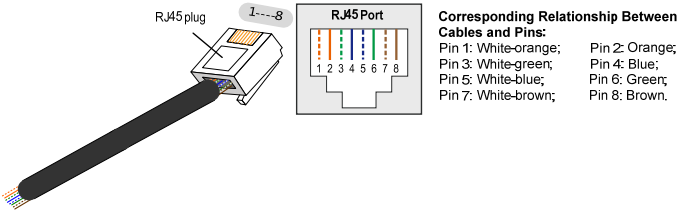
NOTICE

- **The related parameters settings can be changed only by qualified personnel!**
- **RS485 and Ethernet communication connection cannot be used simultaneously due to their different communication protocols, communication abnormal will occur if otherwise.**

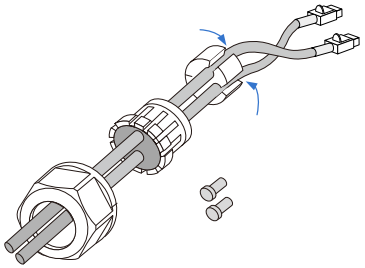
### Ethernet Connection Procedure

1. Loosen all 6 fasten screws on the communication terminal lid and remove the lid.
2. Unscrew Thread-Lock Sealing Nut, pull out the Waterproof Sealing Insert from the port.
3. Lead the network cables through the Thread-Lock Sealing Nut, and the cable gland.
4. Remove the Clamping Claw and two Sealing Plugs from the Waterproof Sealing Insert.

5. Use the Ethernet crimper to crimp the cables and connect cables to RJ45 plug according to TIA/EIA 568B.




6. Insert the network cables into the Waterproof Sealing Insert. Connect the RJ45 plugs into the NET ports on the Communication Configuration Circuit Board until it makes a clicking sound.



7. Push the Waterproof Sealing Insert into the cable gland and make sure that all unused cable openings are sealed with dustproof plugs.
8. Repeat step 1 to step 7 to connect the other inverters with Network cables.
9. Pull cables outwards to confirm whether they are fastened firmly.
10. Plug the other end of network cables into the sockets of the switch or router, connect the switch or router to a PC. Refer to the device manual for the definition of the communication ports.
11. Verify the communication connection and configure the communication parameters.

If there is more than one inverter to communicate with a PC, it is crucial to configure the communication parameters of each inverter. See "**10.13 Setting Communication Parameters** ".

12. If you do not need to connect DI and DO cable, fix all fasten screws to the communication terminal lid, push the Waterproof Sealing Insert back to communication opening and tighten the Thread-Lock Sealing Nut firmly to the cable gland.

### 5.6.4 Power Control Configuration

There are two terminals located on the bottom of the inverter for power control configuration: DI and DO.

Prior to DI/DO connection, please prepare additional materiasl:

| Item | Type | Description |
|---|---|---|
| 1 | DI/DO connection cable | DI: 5 cores cable(5×0.94 mm²)<br>Total diameter: 7.5~8.5 mm<br>DO: 4 cores cable(4×2.5 mm²)<br>Total diameter: 12~13.5 mm |
| 2 | Stripping plier | -- |
| 3 | Three-pole and four-pole plugs | Within the scope of delivery. |
| 4 | Screwdriver | -- |

**Power Control Settings**

The inputs of DI can be used to connect a ripple control receiver for active power control, it set as active power control by default. Please refer to "**6.6 Power Control Configuration**" for DI programming.

Each state has seven functions to choose from, different statues of four digital inputs are the configuration functions of corresponding actions:

- Active power limitation setting (0-100%)
- Reactive power ratio setting (0-100%)
- Power factor setting (0.800-1.000)
- Start
- Stop
- Active power limitation and reactive power ratio setting
- Active power limitation and power factor setting

Where there is only one inverter, users can perform default active power limitation function by connecting the inverter to the ripple control receiver.

Where there are several inverters, set the inverter directly connected to the ripple control receiver via LCD display or Webserver as the master inverter (communication role). Select proper communication interface in Webserver according to the communication cables among the inverters.

**If the RS485 communication is adopted, close all other monitoring devices that use this RS485 communication during grid dispatch.**

Default function configuration of DI is active power limitation: 0%, 30%, 60%, 100%. To change this setting, please login to the Webserver.

NOTICE

**The abovementioned settings are needed only during inverter initialization or after the load default operation.**

The inverter can be linked via Ethernet/RS485 so that the inverter connected to the power grid dispatch device (ripple control receiver) can transmit the information received to other inverters.

In the Ethernet communication connection, only one inverter can be set as master inverter, others shall be set as slave inverters.

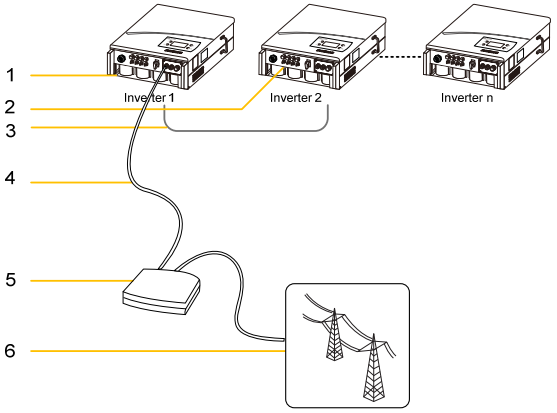



**Fig. 5-14** Connect the ripple control receiver for inverters with RS485 connections

| Item | Description |
|---|---|
| 1 | Master inverter |
| 2 | Slave inverter |
| 3 | RS485 connection |
| 4 | 5-conductor connection at digital input |
| 5 | Ripple control receiver |
| 6 | Grid |

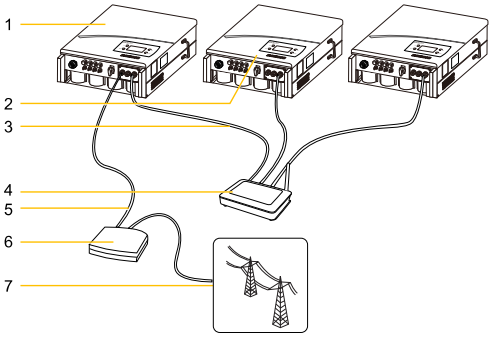
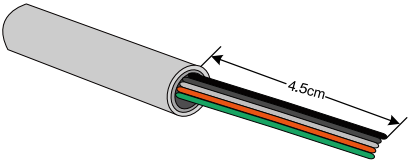



**Fig. 5-15** Connect the ripple control receiver for inverters with Ethernet connections

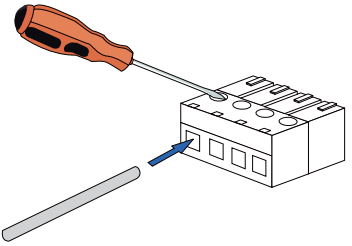
| Item | Description |
|---|---|
| 1 | Master inverter |
| 2 | Slave inverter |
| 3 | Ethernet cable |
| 4 | Router |
| 5 | 5-conductor connection at digital input |
| 6 | Ripple control receiver |
| 7 | Grid |

Connect the cables to DI terminal block according to the terminal assignment.

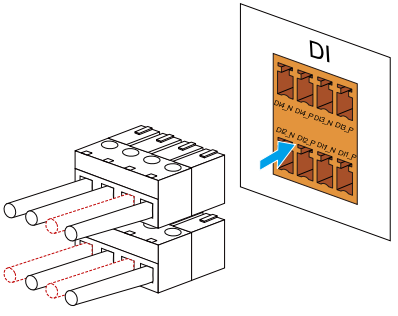
1. Strip approximately 4.5 cm of protective layer off the DI cables.



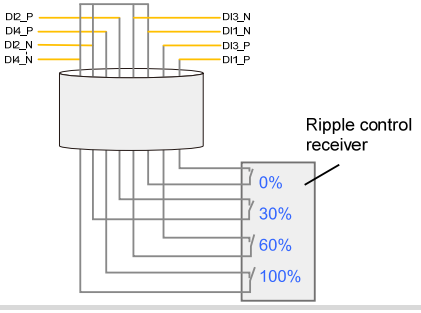

2. Lead the DI connection cables through water-proof terminal and the communication terminal lid.
3. Strip approximately 6 mm of insulation off the insulated wires.
4. Release the sockets of the four-pole plug with a screwdriver and insert individual insulated conductors into corresponding pins of the four-pole plug according to markings shown below:



5. Pull cables outwards to confirm whether they are installed firmly.
6. Connect the four-pole plug to the DI connection socket.




7. Connect the ripple control receiver to the inverter according to the terminal assignment.




The four negative input terminals is equipotential, you can choose any one to connect.

### Multi-function Relay Configuration

The inverter has a multi-functional DO relay, whose switching can be configured.

For example, the DO terminal can be configured with the following functions:

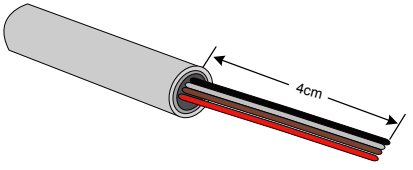
- DO1: Alarm output
- DO2: Consumer load control

The relay is configured as NO contact. The contact can be used in two different operating modes that can be set in the LCD menu of the inverter. You can refer to "**10.10.4** System Configuration" for detailed relay configuration.

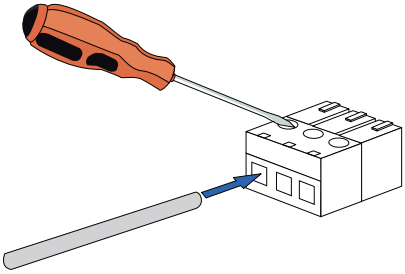
| Relay | Trigger condition | Description |
|---|---|---|
| Alarm output | A fault occurs, which has been selected by the user on the dedicated menu. | Once the inverter reports a fault of those selected, the relay closes the contact. The relay remains triggered until the fault is removed. |
| Consumer load control | The output power of the inverter exceeds the threshold set for grid connection for a while. | Relay is activated when the inverter output power exceeds the threshold for a while. When the set duration is reached or inverter does not run normally during the set period, the relay will disconnect and re-measure the output power. |

Connect all cables to the corresponding terminals:

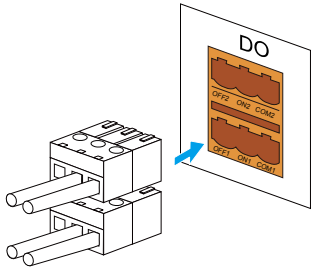
1. Strip approximately 4 cm of protective layer off the DO cable.




2. Lead the DO connection cables through water-proof terminal and the communication terminal lid.
3. Strip approximately 6 mm of insulation off the insulated wires.
4. Release the sockets of the three-pole plug with a screwdriver and insert individual insulated conductor into corresponding pin of the three-pole plug according to markings shown below.



5. Pull cables outwards to confirm whether they are installed firmly.
6. Connect the three-pole plug to the DO connection sockets.




The relay can be configured as NO (by connecting COM and OFF) or NC (by connecting COM and ON) contact.

NOTICE

**You must install an external load relay between the inverter and the consumer load. Do not connect any consumer load directly to the switch output.**

# 6 Visiting and Configuring the Webserver

## 6.1 User and Authority

The Webserver provides user permission and installer permission. To avoid two or more persons to change the inverter configurations at the same time, only one person can login to Webserver at a time.

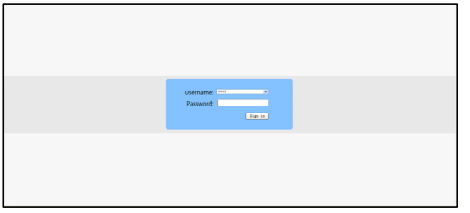
Therefore, once a person logs in and does not exit, other person cannot log in anywhere else. Close the web page when logging out. After logging out, it will take at most 4s until the user log in again.

## 6.2 Login Interface

Query the inverter IP address displayed on the LCD main screen. Open the browser and input the inverter's IP address.

User should select username **user** after signing in with the default sign in password of **1111**. User can change the password after signing in.

After inputting the username and password, press "Sign in" or "Enter" to log in.




If there is no operation for 10 minutes, system will automatically return to the login interface.

## 6.3 Main Interface

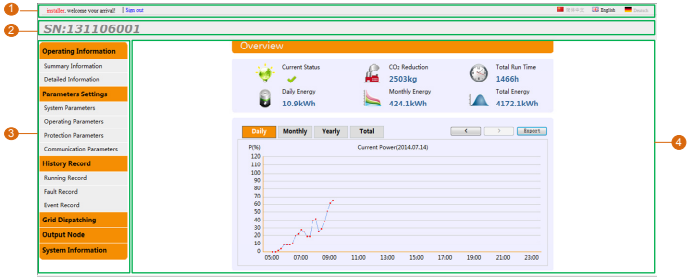
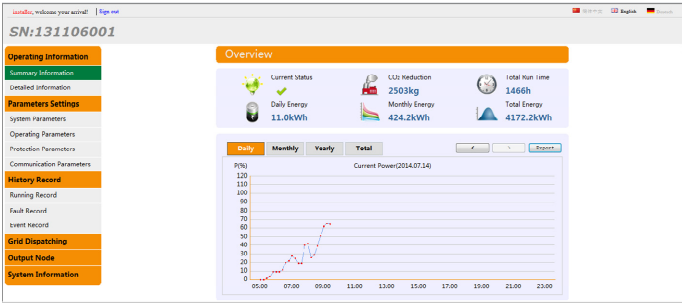



**Fig. 6-1** Webserver-user interface

| No. | Name | Description |
|---|---|---|
| 1 | Status bar | Language selection and user login info |
| 2 | Device info | The serial number of the inverter. |
| 3 | Navigation bar | Operation information, parameter setting, history record, grid dispatching, output node, system information, in which, parameter setting and history record have their second level menus. |
| 4 | Display area | Detailed information of the selected navigation bar |

### 6.3.1 Summary Information

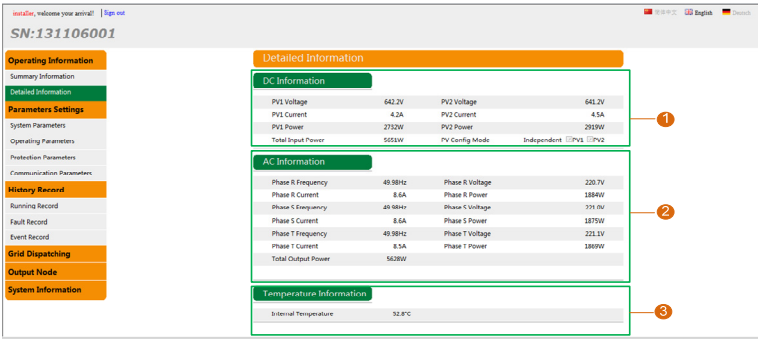



The default interface after login displays the read-only information: current status, $CO_2$ reduction, total run time, daily energy, monthly energy, total energy, daily power curve, monthly energy histogram, yearly energy histogram, and total energy histogram. You can use the "Export" button to export data as a csv file.

**Tab. 6-1** Explanation of the icons

| Icon | Name | Description |
|---|---|---|
| | Current status | : Inverter is not in the fault state.<br>: The inverter is in fault state (DSP and LCD communication fault, or fault of the inverter.) |
| | $CO_2$ reduction | $CO_2$ reduction due to the use of inverter |
| | Total runtime | Inverter total running time |
| | Daily energy | Energy yields of the present day |
| | Monthly energy | Energy yields of the present month |
| | Total energy | Total energy yields since the inverter connects to the grid |

## 6.3.2 Detailed Information



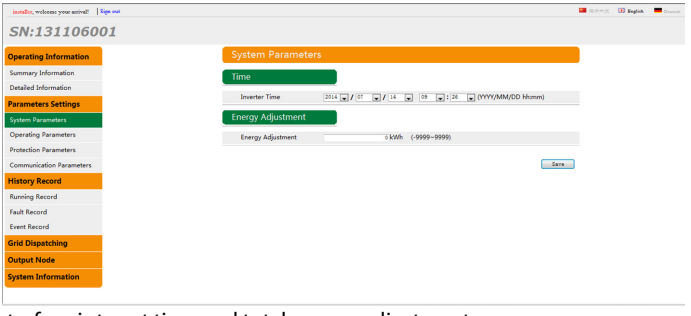

The detailed read-only information is shown below:

| No. | Name | Description |
|---|---|---|
| 1 | DC information | PV1 and PV2 voltage, PV1 and PV2 current, and total input power and so on. |
| 2 | AC information | AC side information |
| 3 | Temperature information | Inverter internal temperature |

## 6.4 Parameter Settings

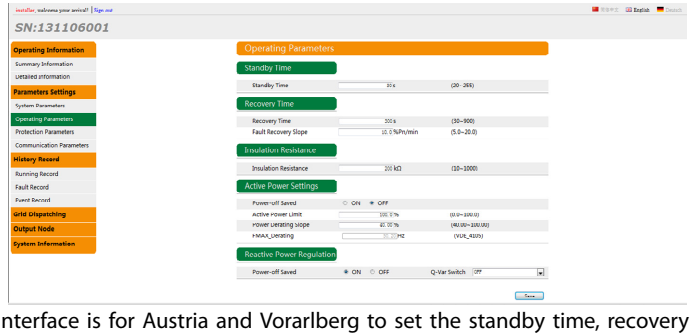
Parameter settings include system parameters, operating parameters, protection parameters, and communication parameters.

### 6.4.1 System Parameters

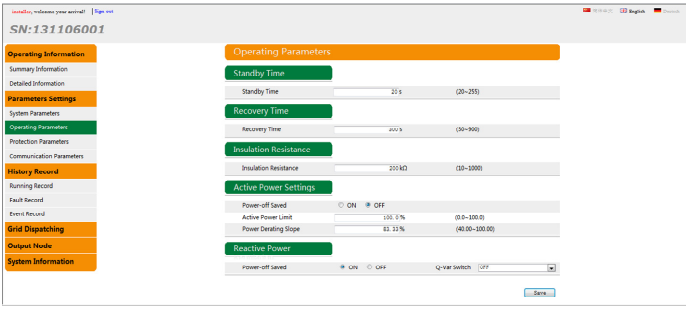



This interface is to set time and total energy adjustment.

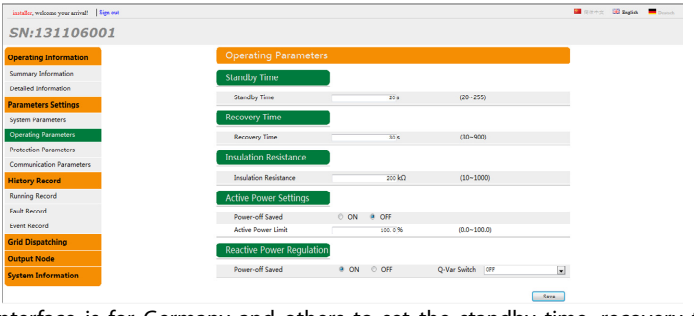
### 6.4.2 Operating Parameters




This interface is for Austria and Vorarlberg to set the standby time, recovery time, insulation resistance, active power settings and reactive power regulation. For detailed information, please refer to "**10.15 Special Settings for Austria and Vorarlberg**".



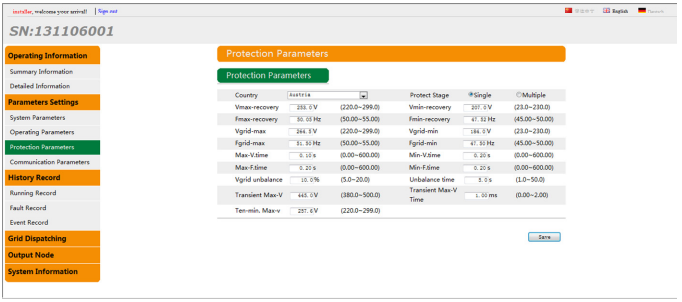

This interface is for Italy to set the standby time, recovery time, insulation resistance, active power settings and reactive power regulation. For detailed information, please refer to "**10.16 Special Settings for Italy**".



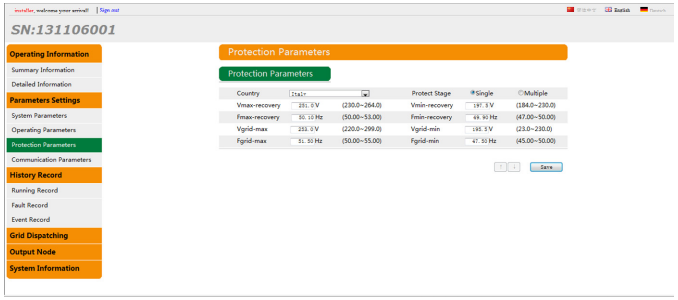

This interface is for Germany and others to set the standby time, recovery time, insulation resistance, active power settings and reactive power regulation. For detailed information, please refer to "**10.11 Setting Running Parameter** ".

To set the Q(P) or Q(U) parameters, please contact SUNGROW to get the installer authority first.

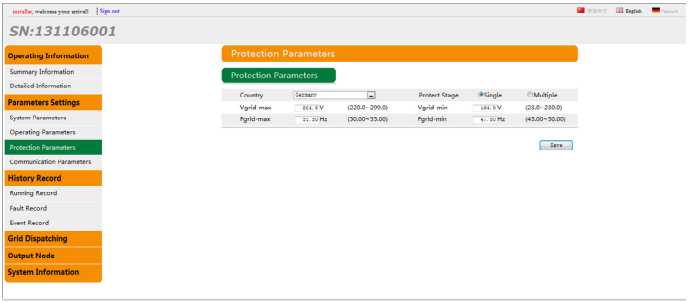
### 6.4.3 Protection Parameters




This interface is for Austria and Vorarlberg to select the grid codes such as voltage, country, single protect stage or multiple protect stage. For detailed information, please refer to "**10.15 Special Settings for Austria and Vorarlberg**".



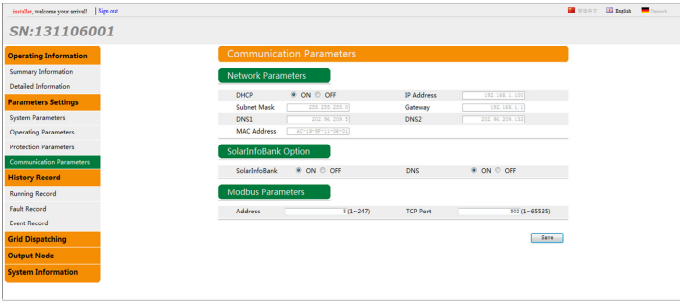

This interface is for Italy to select the grid codes such as voltage, country, single protect stage or multiple protect stage. For detailed information, please refer to "**10.16 Special Settings for Italy**".




This interface is for Germany and others to select the grid codes such as voltage, country, single protect stage or multiple protect stage. For detailed information, please refer to "**10.12 Setting Protective Parameters** ".

To set the abovementioned protection parameters, please contact SUNGROW to get the installer authority first.

### 6.4.4 Communication Parameters

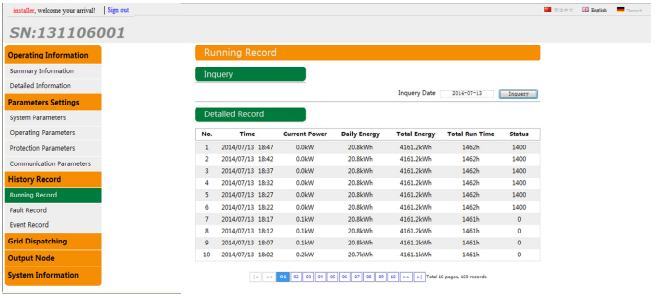



This interface is to set the related communication parameters. The newly set parameters will not be effective immediately. System will adopt the new communication parameter after re-login. For detailed information, please refer to "**10.13 Setting Communication Parameters** ".

## 6.5 History Record

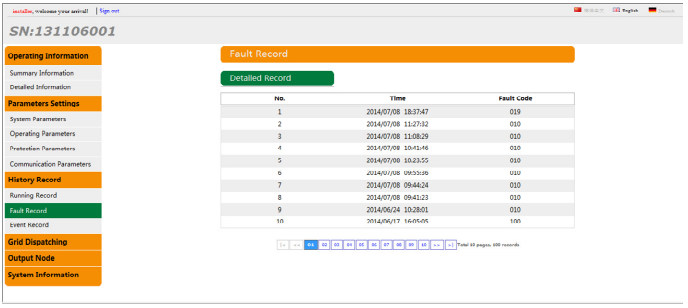
History record includes the running record, fault record, and event record.

### 6.5.1 Running Record




This interface is to search the running information of the inverter. The default display is the running record of the preset day with 10 records in each page. If there is more than 10 records, system will automatically list them in different pages.

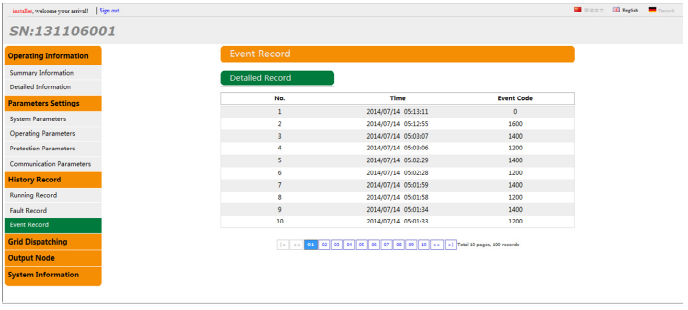
### 6.5.2 Fault Record




This interface is to view the inverter detailed fault records.

At most 100 fault records can be stored with 10 records in each page.

### 6.5.3 Event Record



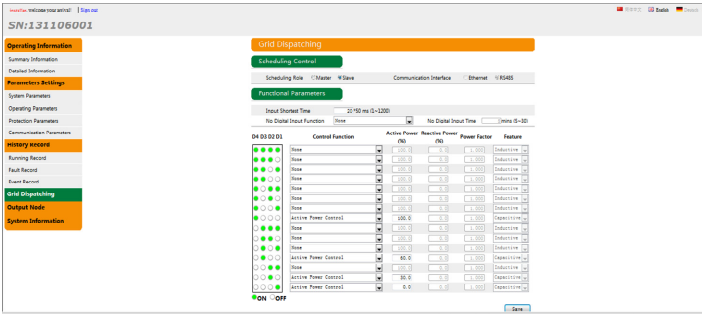

This interface is to view the inverter event records. At most 100 event records can be stored with 10 records in each page.

## 6.6 Power Control Configuration

This interface is to set the grid dispatching parameters. The different statues of four digital inputs are the configuration functions of corresponding actions.

Four inputs can be used to connect a power grid dispatch device (ripple control receiver). A closed relay represents status 1 while open relay is 0.

The default state is 0000, when all four inputs are open. It cannot be applied to power grid dispatch.



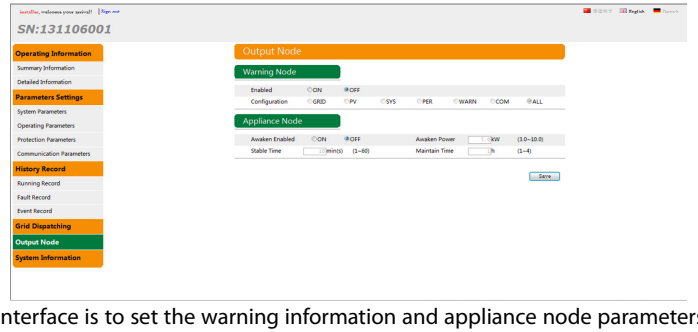

In the event of Ethernet connection as shown in Fig. 5-14, inverter can be the master or the slave during grid dispatch. If the inverter is the master, it can dispatch other salve pieces through the NET ports or RS485 ports.

NOTICE

**It is recommended to perform grid dispatching as per default setting of each configuration status.**

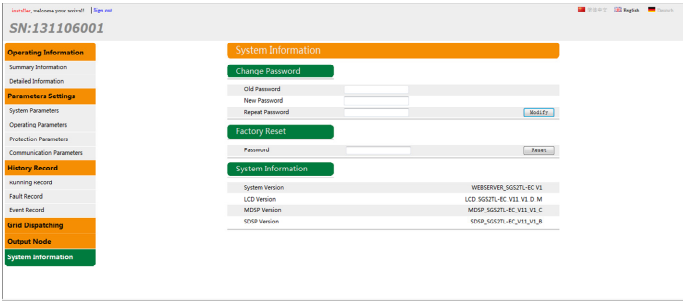
**The change of related parameters must be done only by qualified personnel. Any breach may void warranty claims from SUNGROW.**

## 6.7 Output Node




This interface is to set the warning information and appliance node parameters. For detailed information, please refer to "**10.10.4 System Configuration**".

## 6.8 System Information




This interface is to change the login password, perform load default and check system information.

# 7 Commissioning

Commissioning is a critical part for a well-installed PV system, which can protect against fires, injury and electrical shock.

## 7.1 Inspection before Commissioning

Before starting the inverter, you should check the following items.

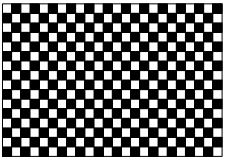
1. The inverter is accessible for operation, maintenance and service.
2. Re-check that the inverter is firmly installed onto the wall.
3. Space for ventilation is sufficient for one inverter or more than one inverter.
4. Nothing is left on the top of the inverter.
5. Inverter and accessories are correctly connected.
6. Cables are routed in safe place or protected against mechanical damage.
7. The selection of AC circuit breaker is optimal.
8. Terminals not used underneath the inverter are sealed.
9. Warning signs & labels are suitably affixed and durable.

## 7.2 Commissioning Procedure

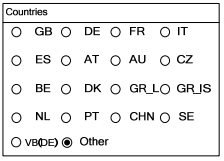
If all checking items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

1. Connect the external AC circuit breaker.

2. Rotate DC the switch to "ON" position.
   Suppose there are sufficient sunlight and enough DC power. PV arrays initialize and supply DC power to inverter.



3. Country selection screen will prompt. Perform country settings with the right two buttons. Detailed button functions can be found in "**10.1 Description of Button Function**". **Press** ▼ to choose country code. Confirm the settings by **Pressing ENTER**.

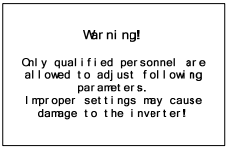



Refer to "**10.12 Setting Protective Parameters** " for country code explanation. If the inverter is installed where the country code is not included, please choose item "Other" and manually set the protective parameters.

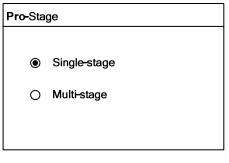
**⚠ CAUTION**

**If the country code is not set correctly during commissioning, reset the protective parameters as dictated in "10.12 Setting Protective Parameters ". There may be faults if otherwise.**

4. Each country code represents corresponding local protective parameters that have been preset before delivery. After country setting, there is the warning screen.


Warning!
Only qualified personnel are allowed to adjust following parameters.
Improper settings may cause damage to the inverter!

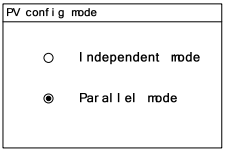
5. After configuring the country code, there will be a "Pro-Stage" type selection screen and then corresponding sub-menu will come up. For detailed information, please refer to "**10.12 Setting Protective Parameters** ".



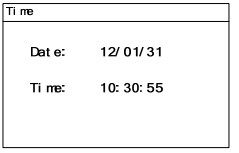

**Single-stage protection**: There is only one protection threshold range for each grid voltage protection parameter.

**Multi-stage protection**: The protection parameters for each grid voltage protection can be set with two threshold ranges.

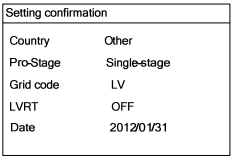
6. According to the actual PV strings configuration mode, choose the same mode in the inverter by the LCD display menu (see "**10.14 Setting PV Configuration Mode** ").



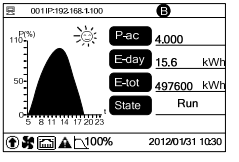

7. Configure time according to the local time. Time setting is very important, which directly affects data logging. **Press** ➤ to move cursor and **Press** ▼ to scroll up time value. Confirm the settings by **Pressing ENTER**. The date format is **YY/MM/DD**. **YY, MM**, and **DD** stand for year, month, and day respectively. The time format is **hh/mm/ss**. **hh**, **mm**, and **ss** stand for hour, minute, and second respectively.




8. After configuring all parameters, there will be a "setting confirmation" screen. Check whether all above-mentioned parameters are correct. Confirm by **Pressing ENTER**. Cancel by **Pressing ESC** and reset.




9. Inverter will enter into startup process. Observe the status of LED indicators and the LCD main screen. If inverter's commissioning succeeds, the "RUN" indicator will be lit and "RUN" will be displayed on the "State" area.




If inverter's commissioning fails, the "FAULT" indicator will be lit and "fault" will occur on the display. **Press** ▼ to view "current fault" information. Remove the existing malfunction and then repeat starting up inverter as the above procedures.

# 8 Disconnecting, Dismantling and Disposing of the Inverter

## 8.1 Disconnecting the Inverter

For maintenance or other service work, the inverter must be switched off. In normal operation, switching off is not necessary.

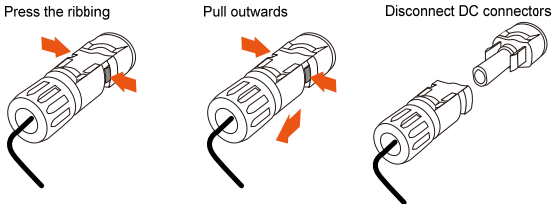
In order to disconnect the inverter from the AC and DC power sources, proceed as follows. Lethal voltages or damages to the inverter will follow if otherwise.

1. Stop the inverter through operating the LCD menu. For details, see "**10.7 Starting and Stopping the inverter**".
2. Disconnect the external AC circuit breaker and prevent it from reconnecting.
3. Rotate the DC switch to the "OFF" position.

NOTICE

**Please strictly follow the above procedures. Otherwise it will cause unrecoverable damage to the inverter.**

4. Wait for about **ten** minutes until the capacitors inside the inverter have discharged.
5. Measure to confirm the AC output at the AC circuit breaker is voltage free.
6. Refer to "5.3.2 Assembling AC Cables to Connector" to release AC connector out of the inverter in reverse steps.
7. Release the locking part of DC connectors by pressing on the ribbing of the locking hooks with nipper pliers and pull it outwards.



For further disconnection and conductor reconnection instruction, please visit the webpage of device manufacturer.

## 8.2 Dismantling the Inverter

Refer to Chapter 4 and Chapter 6 for the inverter dismantling in reverse steps. If necessary, remove the wall bracket from the wall.

**CAUTION**

**There is a risk of burn injuries and electric shock!**

**Wait at least 10 minutes after disconnecting the inverter from the utility grid and the PV input before touching any inner live parts.**

NOTICE

**If the inverter will be reinstalled in the future, please refer to *Chapter 4 and Chapter 4.1* for a proper conservation.**

## 8.3 Disposing of the Inverter

Users should take the responsibility for the disposal of the inverter.

NOTICE

**Some parts and devices of the inverter, such as, LCD displayer, batteries, capacitors, may cause environment pollution.**

**Users must comply with the related local regulations to avoid the potential pollution.**

# 9 Troubleshooting and Maintenance

## 9.1 Troubleshooting

### 9.1.1 Troubleshooting of LED Indicator

See "**Tab. 2-2 Description of LED Indicators**" for the definition of indicator states.

| Fault type | Troubleshooting |
|---|---|
| LED indicators and LCD screen cannot be lit | 1. Disconnect AC circuit breaker.<br>2. Rotate the DC Switch to the "OFF" position.<br>3. Check the polarity of DC input. |
| "RUN" indicator goes out | 1. Disconnect AC circuit breaker.<br>2. Rotate the DC Switch to the "OFF" position.<br>3. Check the correctness of electrical connection of inverter. See "**Fig. 5-1Electrical Connection Diagram**".<br>4. Check whether DC input voltage exceeds the inverter start voltage.<br>5. If all above conditions are OK, please contact SUNGROW. |
| "Fault" indicator is lit | 1. A fault is not removed.<br>2. Perform troubleshooting according to fault type in LCD screen. See "**9.1.2 Troubleshooting of Faults in LCD Screen**".<br>3. If it cannot be solved, please contact SUNGROW. |

### 9.1.2 Troubleshooting of Faults in LCD Screen

When faults occur, "Fault" state will be shown on the main screen. **Press** ▼ to view multiple "current fault" information pages.

| Fault code | Specification | Troubleshooting |
|---|---|---|
| 002 | The grid voltage has exceeded inverter allowable upper limit. | 1. Check the voltage of the grid.<br>2. If the grid voltage exceeds the permissible range of inverter protective parameters, ask utility grid company for solution.<br>3. If the grid voltage is within the permissible range, contact SUNGROW Service Dept.. |

| Fault code | Specification | Troubleshooting |
|---|---|---|
| 003 | Inverter has checked that the instantaneous sample value of the grid voltage exceeds the allowable limit for some time. | 1. This is a short-term fault due to grid condition. Wait a moment for inverter recovery.<br>2. If the fault still exists, please contact SUNGROW Service Dept.. |
| 004 | The grid voltage has fallen below inverter's allowable lower limit. | 1. Check the voltage of the grid.<br>2. If the grid voltage exceeds the permissible range of inverter protective parameters, ask utility grid company for solution.<br>3. If the grid voltage is within the permissible range, contact SUNGROW Service Dept.. |
| 005 | The grid voltage is too low. | |
| 007 | Inverter has detected AC overcurrent temporarily. | 1. The inverter will resume if the output current falls below the protective value.<br>2. If the fault still exists, please contact SUNGROW Service Dept.. |
| 008 | The grid frequency has exceeded inverter allowable upper limit. | 1. Check the frequency of the grid.<br>2. If the grid frequency exceeds the permissible range of inverter protective parameters, ask utility grid company for solution.<br>3. If the grid frequency is within the permissible range, contact SUNGROW Service Dept.. |
| 009 | The grid frequency has fallen below inverter allowable lower limit. | |
| 010 | Islanding | 1. Check whether AC circuit breaker is triggered.<br>2. Check whether AC cables are all firmly connected.<br>3. Check whether grid is not on service.<br>4. If all conditions are OK and this fault still occurs in the LCD screen, contact SUNGROW Service Dept.. |
| 011 | The DC component of AC current has exceeded inverter limit. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 012 | Inverter has detected that there is a failure current. | 1. Check the PV strings for ground fault.<br>2. Contact SUNGROW if the fault reoccurs. |
| 014 | The average grid voltage is not within the permissible range for over 10 minutes. | 1. Check whether the grid is operating normally.<br>2. Wait a moment for inverter recovery.<br>3. Contact SUNGROW if the fault reoccurs. |
| 015 | Grid impedance has exceeded inverter's limit | 1. Check whether the grid is operating normally. |

| Fault code | Specification | Troubleshooting |
|---|---|---|
| | | 2. Check AC cables for inappropriate size.<br>3. Wait a moment for inverter recovery.<br>4. Contact SUNGROW if the fault reoccurs. |
| 017 | The inverter has detected that there is unbalance between the three phase voltages. (**Only valid in Austria.**) | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 019 | The bus voltage is temporarily high. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 021 | Inverter has checked that there is overcurrent of PV1 input. | Check the layout and the wiring of PV1 input. |
| 022 | Inverter has checked that there is overcurrent of PV2 input. | Check the layout and the wiring of PV2 input. |
| 024 | Inverter has checked the deviation of neutral point voltage. | 1. Inverter will recover if the deviation value falls below the protective limit.<br>2. Contact SUNGROW if the fault reoccurs. |
| 026 | There is high Bus fluctuation voltage. | 1. This is a short-term fault. Wait a moment for inverter recovery.<br>2. If the fault still exists, please contact SUNGROW Service Dept.. |
| 028 | Inverter has checked the reverse polarity of PV1 connection. | 1. Disconnect the DC switch.<br>2. Disconnect inverter.<br>3. Check the polarity of the PV inputs, if the polarity is incorrect, please reconnect PV strings. |
| 029 | Inverter has checked the reverse polarity of PV2 connection. | |
| 037 | Enclosure over-temp. The ambient temperature of the enclosure exceeds the threshold. | 1. Check whether AC output power exceeds nominal power too much.<br>2. Check whether fans work normally and whether there are some abnormal fans. Please replace broken fan, if necessary.<br>3. Clean air grills of outlet.<br>4. If the fault still exists, please contact with SUNGROW. |
| 038 | Relay fails.<br>Relay is in poor contact. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 042 | Current imbalance. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 044 | A fault is detected during inverter self-detection.<br>DC-AC conversion fails | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 045,046*[1] | PV auto-detection fault | 1. Wait a moment for inverter recovery. |

| Fault code | Specification | Troubleshooting |
|---|---|---|
| | Faults detected in PV1 or PV2 boosted circuit | 2. Contact SUNGROW if the fault reoccurs. |
| 047 | The PV configuration mode set on the display is not in accordance with the configuration in the connection cabinet. | 1. Disconnect inverter.<br>2. Re-select PV configuration mode and re-connect PV strings. For more detailed information please refer to "5.4 Connecting Inverter to PV Arrays". |
| 048 | Phase-R current sampling channel fault. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 049 | Phase-S current sampling channel fault. | |
| 050 | Phase-T current sampling channel fault. | |
| 100 | Inverter overcurrent hardware protection<br>AC current has exceeded the hardware limit. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 101 | Grid over-frequency<br>Grid frequency is outside the permissible range. | 1. Check the frequency of the grid.<br>2. If the grid frequency exceeds the permissible range of inverter protective parameters, ask utility grid company for solution.<br>3. If the grid frequency is within the permissible range, contact SUNGROW Service Dept.. |
| 102 | Grid under-frequency<br>Grid frequency is outside the permissible range. | |
| 103 | Grid voltage synchronization fault<br>The grid voltage sampling differences between the master and slave DSP. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 104 | Grid frequency synchronization fault;<br>The grid frequency sampling differences between the master and slave DSP. | |
| 200 | The bus voltage exceeds the set value of the hardware | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 201 | The bus voltage drops during grid connection | |
| 202 | PV1 or PV2 current exceeds the set value of | |

| Fault code | Specification | Troubleshooting |
|---|---|---|
| | the hardware | |
| 203 | The PV input voltage exceeds the bus voltage. | 1. Check the functionality of the PV connection terminal；<br>2. Contact SUNGROW if the fault reoccurs. |
| 300-301 | The temperature of some components inside the cabinet is too high | 1. Check the functionality of the fans;<br>2. Clean the air inlet and outlet;<br>3. Clean air grills of outlet.<br>4. If the fault still exists, please contact SUNGROW. |
| 302 | PV1 and PV2 insulation resistance to the ground exceeds the set value | 1. Check whether the PV connection cables are intact.<br>2. Check whether the ambient humidity of PV components is too high.<br>3. Check whether the "PE" cable and the N cable are well-connected;<br>4. Wait until the inverter reverts to normal;<br>5. Contact SUNGROW if the fault reoccurs. |
| 306 | Deviation between the PV input power and output power | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 307 | Open circuit voltage of the PV array is too high, leading the input power exceeds the permissible range | 1. Check whether the configuration of PV array exceeds the permissible range of the inverter.<br>2. Wait a moment for inverter recovery.<br>3. Contact SUNGROW if the fault reoccurs. |
| 308 | Accessary processor fault.<br>Redundant fault detected. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 309-318 | Voltage and current sampling fault before grid connection | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 320*2 | Leakage current CT self-detection fault | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 401-409 | Permanent fault | 1. If there are no other problems and the inverter is required to keep operating, restart the inverter immediately.<br>2. Contact SUNGROW if the fault reoccurs. |
| 500 | SPD or FUSE warning **(Displayed only in optional version)**<br>Surge protection device damaged or FUSE blown out. | If necessary, please contact SUNGROW Service Dept. to replace the SPD or FUSE. |
| 501-502 | Inverter internal communication failure. | Contact SUNGROW if the fault reoccurs. |

| Fault code | Specification | Troubleshooting |
|---|---|---|
| 503-508 | Temperature sensor warning | Contact SUNGROW if the fault reoccurs. |
| 509 | Input mode configuration under DC mode fails | 1. Check the input mode on the LCD screen, the default input mode is PV mode.<br>2. Contact SUNGROW if the fault reoccurs. |
| 510 | The PV panel configuration exceeds the optimum operating range of the inverter. | 1. Check whether the configuration of PV array exceeds the permissible range of the inverter.<br>2. Contact SUNGROW if the fault reoccurs. |
| 512-513*3 | Fans are defective. | 1. Wait a moment for inverter recovery.<br>2. Contact SUNGROW if the fault reoccurs. |
| 515 | Boost short circuit warning. | Contact SUNGROW if the fault reoccurs. |

Note: *1 fault code here is for SG8KTL-EC and SG10KTL-EC; while for SG12KTL-EC, the fault code is 304 and 305.

*2 fault code here is for SG8KTL-EC and SG10KTL-EC; while for SG12KTL-EC, the fault code is 041.

*3 fault code here is for SG8KTL-EC and SG10KTL-EC; while for SG12KTL-EC, the fault code is 070-071.

Should you have any problems in operating the inverter, please contact us:

Service hotline: +86 551 6532 7817

Email: service@sungrow.cn

We need the following information to provide you the best assistance:

- Type of the inverter
- Serial number of the inverter
- Fault code/name
- Brief description of the problem

## 9.2 Maintenance

### 9.2.1 Routine Maintenance

| Items | Methods | Period |
|---|---|---|
| Save data | Save the running data, parameters and log to a disk or a file. | Once 100 days |
| General state of system | Visual check for any damage or deformation of the inverter.<br>Check there is any abnormal noise during the running of the inverter.<br>Check each parameter of inverter operation.<br>Check if the temperature of the housing is normal. Monitor the system using the thermal imager. | Every 6 months |
| System clean | Check the temperature and dust of the inverter. Clean the inverter enclosure.<br>Check the humidity and dust of the environment. Meanwhile check whether the filter function of the air inlet is ok. Clean the air inlet and outlet, when necessary. | Six months to a year (it depends on the dust contents in air.) |
| Electrical connection | Check whether cable connections are loose. Tighten the loose connections.<br>Check whether there is damage to the cables, especially the surface in contact with metal.<br>Check whether the wrap belt of the connection terminals is strip-off. | Six months after commissioning and then once or twice a year. |
| Fans | Check whether there is crack of the fan blade<br>Check whether there is any abnormal noise when the fan is turning.<br>Clean or replace the fans. | Once a year |
| Safety function | Check the LCD stop and emergency stop circuit of the system.<br>Simulate shutdown and check stop signal communication.<br>Check the warning labels, and replace them if necessary. | Once or twice a year |
| Software | Software optimization.<br>Check the setting of every parameter. | Once or twice a year |

### 9.2.2 Maintenance Instruction

**DANGER**

**Disconnect the inverter from the grid first and then PV arrays before any maintenance work.**

**Lethal voltage still exists in the inverter. Please wait at least ten minutes and then perform maintenance work.**

#### Replacing Fan

Fans are wear and tear component of the inverter. To ensure that the inverter works well, the internal fans should be replaced every 10 years or when a failure occurs.

If there is overheat and abnormal noise, please wait a moment for the fan recovery. If the abnormal noise still exists after a moment, please contact SUNGROW Service Dept. to replace the fan.

**DANGER**

- **Disconnect the inverter from the grid first and then PV arrays before any maintenance work.**
- **Fans' maintenance work may only be performed by qualified electricians.**

#### Air Inlet and Outlet Cleaning

To have a good heat exchange with the environment, clean the heat sink every one to two years or when necessary.

Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.

#### Battery Maintenance

There is a button battery on the inner LCD PCB board. Contact SUNGROW Service Dept. to replace the battery when it is end of service life.

# 10 Operating the LCD Menu

## 10.1 Description of Button Function

Inverter offers two buttons for the user to look up the running information and configure parameters. The two buttons have multiple functions. Please refer to Tab. 10-1 before any operation onto inverter.

**Tab. 10-1** Button Function

| Button | Operation | Description |
|---|---|---|
| | Press less than one second | Move upwards or downwards, or increase setting value. Hereinafter, it is referred to as "Press ▼". |
| | Press more than one second | Return to the previous menu or cancel the command. Hereinafter, it is referred to as "Press **ESC**". |
| | Press less than one second | Move left or right, or turn pages. Hereinafter, it is referred to as "Press ➤". |
| | Press more than one second | Enter into the submenu or confirm the command. Hereinafter, it is referred to as "Press **ENTER**". |

The background illumination of the LCD screen will go out to save power if there is no button operation for one minute. Reactivate it by pressing any button.

## 10.2 Inverter Menu Structure

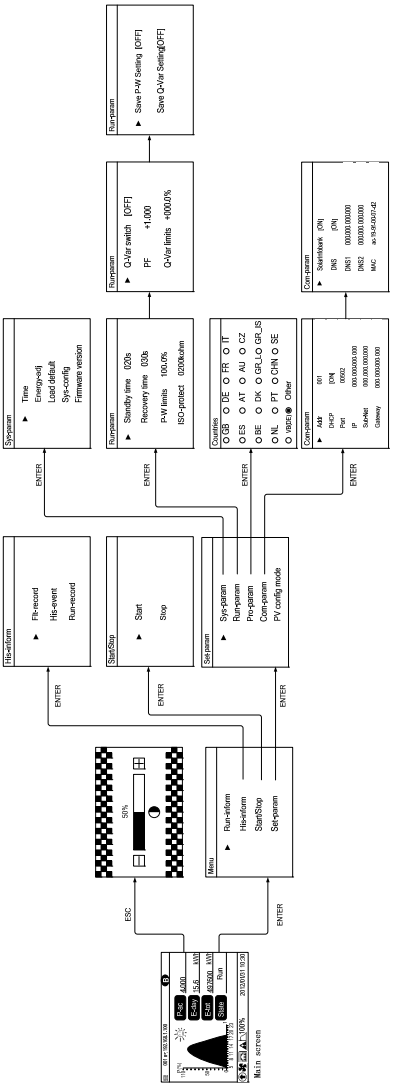



**Fig. 10-1** Menu Tree-English

*The menu tree of SG12KTL-EC doesn't have the submenu "ISO-protect".

## 10.3 Main Screen

If the inverter succeeds in commissioning, LCD display will enter into the main screen, as shown in Fig. 10-2.

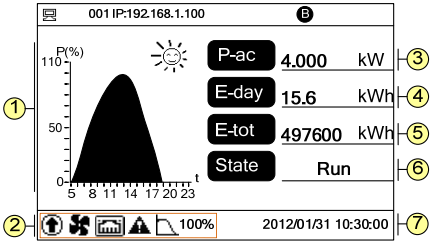



**Fig. 10-2** Main Screen Description

| No. | Description |
|---|---|
| 1 | Power curve. x-axis: time in hours; y-axis: output power yield P in %. |
| 2 | Icons (refer to the Tab. 10-3) and the Inverter active power limits (P-W limits). |
| 3 | Current output power. |
| 4 | Energy generation during this day until now. |
| 5 | Total energy generation since initial commissioning. |
| 6 | Inverter state. |
| 7 | Date (year/month/date) and time. |

NOTICE

**The energy yields displayed by the LCD panel are indicative only.**

**For the actual yields, please refer to the electric energy meter.**

**Tab. 10-2** Inverter State Description

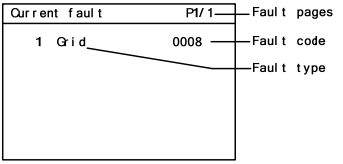
| Inverter State | Description |
|---|---|
| Run | After being energized, the inverter tracks the PV arrays' maximum power point (MPP) and feeds AC power to grid. This mode is the normal mode. |
| Standby | In this mode the inverter will wait for sufficient sunlight and the DC voltage to recover. The PV voltage is more than 230V. |
| Key-stop | The inverter will stop operation by manual "stop" through LCD menu. |
| Ini-standby | The state when inverter is power-on for the first time. The PV voltage is less than 230V. |
| Startup | The inverter is initializing and synchronizing with the grid. |
| Com-err | Inverter internal communication failure. |

| Inverter State | Description |
|---|---|
| Fault | If a fault occurs, the inverter will automatically stop operation, trigger the AC relay and show "Fault" on the LCD with the "FAULT" indicator on.<br>Once the fault is removed in recovery time (set by user, see "**10.11 Setting Running Parameter** "), the inverter will automatically resume running. |
| Upd-fail | The master DSP program online upgrade failure. |

NOTICE

- **If the device is in standby mode for more than 10 minutes, please check if the insolation is sufficient and the PV connection is correct.**
- **If no anomaly is found, please disconnect DC switch and grid switch to restart.**
- **If it still does not work, contact SUNGROW.**

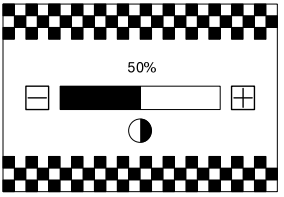
If inverter is in "Fault" state, Press ➤ to view multiple "Current fault" information pages. For specific fault information, please refer to "**9.1.2 Troubleshooting of Faults in LCD Screen"**.




**Tab. 10-3** Description of icons

| Icon | Description |
|---|---|
| | DSP or LCD is in IAP update process. |
| | Fan inside is working. |
| | The Ethernet communication cable is active. |
| | Inverter is in warning state. |
| | LCD and Bank server is successfully connected. |
| | Inverter is in power reduction state. |

## 10.4 Adjusting Contrast




1. Press **ESC** to enter into the contrast adjustment screen.
2. Press ➘ to increase the setting value and press ➤ to decrease the value.
3. Press **ENTER** to confirm the contrast setting.

The contrast value ranges from 0 to 100. The recommended value is 50 or 60.

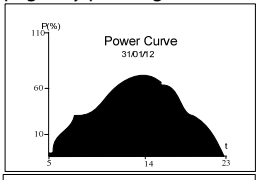
## 10.5 Viewing Detailed Running Information

On the main screen, there is some basic information about the inverter. For more detailed running information, please operate as follows.

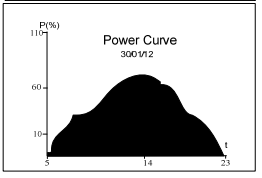
Main Screen ( **Press ENTER** ) →Menu→Run-inform ( **Press ENTER** )

LCD screen will show detailed running information. Scroll pages by pressing ➤ /➘.

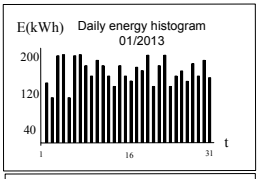
Power curve during this day until now.



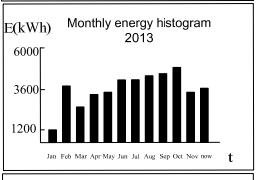

Power curve of yesterday.



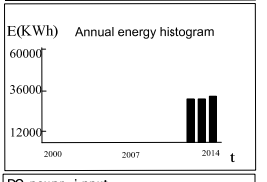
Energy generated each day in this month.




Energy generated every month in this year.




Total annual generating capacity in the past fifteen years.




**DC power input:** The total input power of PV1 and PV2.
**Vdc:** DC voltage of each input.
**Idc:** DC current of each input.
**Pdc:** DC power of each input.
**Indep mode:** PV configuration mode of the two PV inputs.
√**:** The corresponding input is at work.

| DC power input | | |
|---|---|---|
| | PV1 | PV2 |
| Vdc[V] | 0000.0 | 0000.0 |
| Idc[A] | 000.0 | 000.0 |
| Pdc[W] | 00000 | 00000 |
| Indep mode | √ | √ |

**Vac:** Phase voltage.
**Iac:** Phase current.
**Pac:** AC output power of each phase.
**F:** Frequency of each phase.

| | L1 | L2 | L3 |
|---|---|---|---|
| Vac[V] | 000.0 | 000.0 | 000.0 |
| Iac[A] | 000.0 | 000.0 | 000.0 |
| Pac[W] | 0000 | 0000 | 0000 |
| F[Hz] | 00.00 | 00.00 | 00.00 |

**$CO_2$-reduce:** Total $CO_2$ emission reduction due to the inverter.
**E-month:** The energy generated in this month.
**h-Total:** Total running hours of the inverter.
**T-today:** Daily running time of the inverter.
**Temp:** Internal temperature of the inverter.
**Peak-Power:** Daily peak power value.

| | |
|---|---|
| CO2-reduce | 00000kg |
| E-month | 00000kWh |
| h-Total | 0000h |
| T-today | 0000min |
| Temp | 000.0°C |
| Peak Power | 0000W |

**P-W:** Inverter output active power.
**Country:** Inverter selected country code.

| | |
|---|---|
| P-W | 00000W |
| Country | DE |
| | |
| | |
| | |
| | |

The power value indicated by each column of the histogram represents the average value of the power during the related unit interval.

## 10.6 History Running Information

### 10.6.1 Fault Records

Main Screen ( **Press ENTER** ) →Menu ( **Press ▼** ) →His-inform ( **Press ENTER** ) →Flt-record ( **Press ENTER** )

Inverter shows fault record pages.
Scroll pages by pressing ➤.

| Flt-record | P 1/1 |
|---|---|
| 001 01/31/2013 10:16:10 | 008 |

The inverter can only store at most 100 latest fault records.

### 10.6.2 History Event Records

Main Screen ( **Press ENTER** ) →Menu ( **Press ▼** ) →His-inform ( **Press ▼** ) → His-event ( **Press ENTER** )

Inverter shows history event record pages.
Scroll pages by pressing ➤.

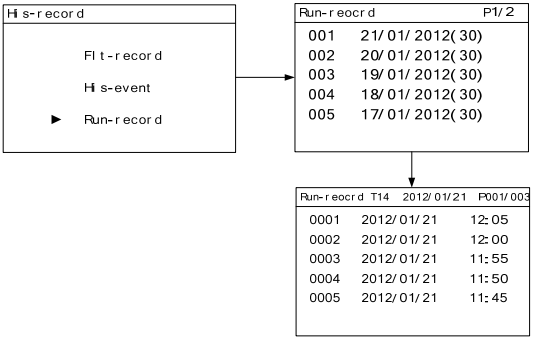
| His-event | P 1/1 |
|---|---|
| 001 01/31/2013 10:16:10 | Flt |

The inverter can only store at most 100 latest history event records.

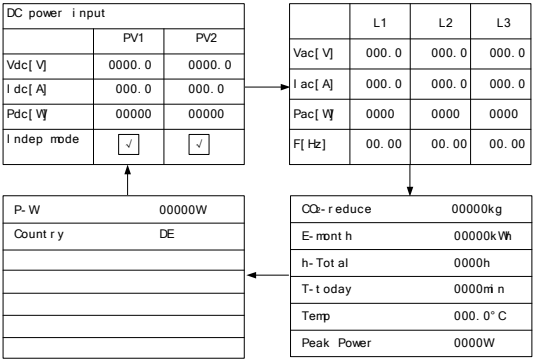
### 10.6.3 Running Information Records

Main Screen ( **Press ENTER** ) →Menu ( **Press ▼** ) →His-inform ( **Press ▼×2** ) →Run-record ( **Press ENTER** )

On the "Run-record" display, you can scroll pages by pressing ➤, and press ▼ to select the date you want to view. Confirm by pressing **ENTER**.



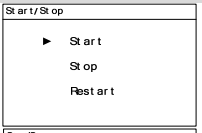

Inverter shows history running information pages. Scroll among pages by pressing ➤/▼.

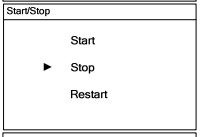


## 10.7 Starting and Stopping the inverter

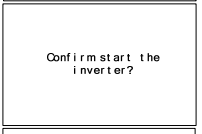
Main Screen ( **Press ENTER** ) → Menu ( **Press ▼×2** ) → Start/Stop ( **Press ENTER** )

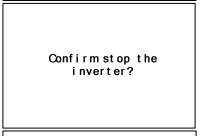
**Press ▼** to choose "Start"/"Stop" and **press ENTER** to confirm the choice.

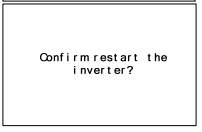



**Press ENTER** to confirm your choice.




The Restart item will appear only when a permanent fault occurs.

## 10.8 Entering Password

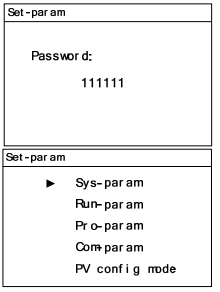
The parameter settings are password-protected. You can see the inverter's parameters or set the system parameters if you input a default password **A**(111111).

You can set all parameters of the inverter if you input a dedicated password **B**. Please ask SUNGROW or your dealer for this password.

1. **Press ENTER** to enter into "Menu" screen.
2. **Press ▼** to move the cursor to "Set-param" menu item and confirm by **pressing ENTER**.

3. A password confirmation screen will occur. **Press** ➤ to move cursor right and **Press** ➘ to input the password **A**.

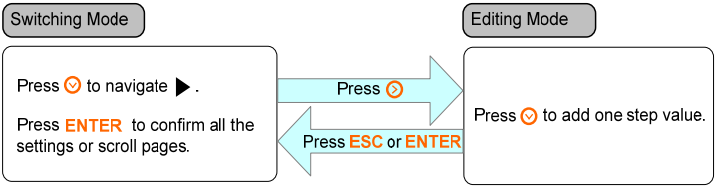
4. **Press ENTER** to confirm the password and enter the "Set-param" submenu.




## 10.9 Button Operation for Parameters Setting

The button functions for parameter setting in submenus may differ from that in other menus.

Proceed as follows to perform the parameter settings.


Switching Mode
Editing Mode
Press ⊙ to navigate ▶.
Press ENTER to confirm all the settings or scroll pages.
Press ⊙
Press ESC or ENTER
Press ⊙ to add one step value.

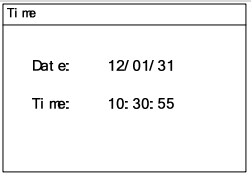
## 10.10 Setting System Parameters

### 10.10.1 Setting the Time

If there is deviation between the time on inverter main screen and your local time, you should adjust the time on the inverter to the local time. Otherwise the inverter data logging will fail. Clock is in 24-hour format.

Main Screen(**Press ENTER**) → Menu screen(**Press ▼ × 3**) → Set-param(**Press ENTER**) → Enter password A(**Press ENTER**) → Sys-param(**Press ENTER**) → Time(**Press ENTER**)

On the "Time" screen, **Press ➤** to move the cursor right and **Press ▼** to set the correct date and time.
Confirm settings by **pressing ENTER**. The date format is **YY/MM/DD**. **YY, MM**, and **DD** stand for year, month, and day respectively. The time format is **hh/mm/ss**. **hh**, **mm**, and **ss** stand for hour, minute, and second respectively.

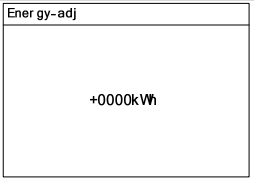



### 10.10.2 Energy Adjustment

If the accumulative value of "E-total" in the inverter is different from the value in the external metering device, you should adjust the "Energy-adj" setting.

Main Screen(**Press ENTER**) → Menu screen(**Press ▼ × 3**) → Set-param(**Press ENTER**) → Enter password A(**Press ENTER**) → Sys-param(**Press ENTER, Press ▼**) → Energy-adj(**Press ENTER**)

On the "Energy-adj" screen, Press ➤ to move the cursor right and **Press ▼** to set the correct offset value.
Confirm settings by pressing **ENTER**.
The positive symbol "+" can be changed to the negative symbol "-" by pressing ▼.
The adjustment range is from -9999 kWh to +9999 kWh.
(Energy-adj value)= (Real measured value) - (E-tot reading value).



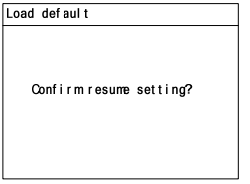

### 10.10.3 Load Default

NOTICE

**All history information will be unrecoverable cleared and all parameters will return to the default value except the protective parameters and time once the "load default" operation is performed.**

Main Screen(**Press ENTER**)→Menu screen(**Press ▼ × 3**)→Set-param(**Press ENTER**)→Enter password A(**Press ENTER**)→Sys-param(**Press ENTER**, **Press ▼×2**)→Load default(**Press ENTER**)

Press **ENTER** to confirm "load default".



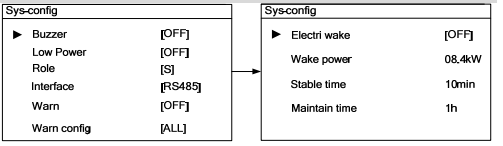

## 10.10.4 System Configuration

Main Screen(**Press ENTER**)→Menu screen(**Press ▼ × 3**)→Set-param(**Press ENTER**)→Enter password A(**Press ENTER**)→Sys-param(**Press ENTER**, **Press ▼×3**)→Sys-config(**Press ENTER**)

On the "Sys-config" screen, scroll pages by pressing **ENTER** and press ▼ to select one item.

For each item setting, **Press ➤** to move the cursor right and **Press ▼** to set the appropriate value.

Confirm settings by Pressing **ENTER**.




| System Configuration Item | Description |
|---|---|
| Buzzer | **OFF:** Deactivate the sound of the button. |
| Low Power | **OFF:** Deactivate the sound of the button. |
| Role | **M/S:** Main/Slave inverter.<br>All inverters can be set as main or slave inverter in the communication link, but there can be only one master inverter. |
| Interface | **RS485/ETH:** RS485 or Ethernet communication interface. |
| Warn | **ON/OFF**: Activate/Deactivate the Warning function of DO. |
| Warn config | The relay switches state when the inverter reports faults of those selected from the menu.<br>**ALL**: all faults **GRID**: grid fault **PV**: PV fault<br>**SYS:** system fault **PER:** permanent fault **WARN:** warning<br>**COM:** communication fault |

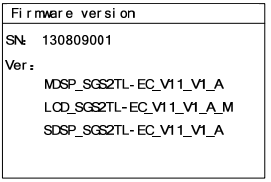
| | |
|---|---|
| Electri wake | This section of the menu allows you to enable/disable the household load function. |
| Wake power | The lowest power of the inverter for activating the Electri wake function.<br>**SG8KTI-EC:** Range: 2.4kW - 8kW , Default: 5.6kW.<br>**SG10KTI-EC:** Range: 3kW - 10kW , Default: 7kW.<br>**SG12KTI-EC:** Range: 4kW - 12kW , Default: 8.4kW. |
| Stable time | The time needed before the relay receives drive signal.<br>Range: 1min - 60min , Default: 10min. |
| Maintain time | The time duration of relay drive signal.<br>Range: 1hour - 4hour, Default: 1hour. |

### 10.10.5 Firmware Version

Main Screen(**Press ENTER**)→Menu screen(**Press ▼ ×3**)→Set-param(**Press ENTER**)→Enter password A(**Press ENTER**)→Sys-param(**Press ENTER, Press ▼×4**)→Firmware version(**Press ENTER**)

Inverter shows detailed firmware information, including LCD version and DSP version.

The firmware version information is read only.

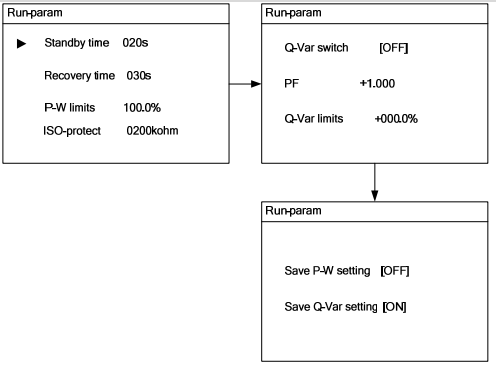


# 10.11 Setting Running Parameter

## 10.11.1 Main Screen of Run-param

Main Screen(**Press ENTER**)→Menu screen(**Press ▼ ×3**)→Set-param(**Press ENTER**)→Enter password B(**Press ENTER, Press ▼**)→Run-param(**Press ENTER**)

On the "Run-param" screen, scroll pages by pressing **ENTER** and press ▼ to select one item.
For each item setting, **Press** ➤ to move the cursor right and **Press** ▼ to set the appropriate value.
Confirm settings by Pressing **ENTER**.




**Tab. 10-4** Specification of Running Parameters

| Parameter | Explanation | Default | Range |
|---|---|---|---|
| Standby time | The time from inverter initialization to inverter feeding power to grid. | Austria and Vorarlberg: 30s<br>Others: 20s | 20s…255s |
| Recover time | The time from the fault is cleared to inverter feeding power to grid. | Austria, Italy, and Vorarlberg: 300s<br>Others: 30s | 30s…900s |
| P-W limits | Inverter active power limits. | 100.0% | 0...100% |
| ISO-protect | Protection value of the insulation resistance | 200kohm | 10kohm...1000kohm |
| PF | Power factor | +1.000 | -1.000…-0.800/+0.800…+1.000 |

| Parameter | Explanation | Default | Range |
|---|---|---|---|
| Q-Var limits | Inverter reactive power limits | 0.0% | 0...+100%/0…-100% |
| Q-Var switch | Whether to start inverter reactive power adjustment function. | [Pf] | [Pf]/[Qt]/[Off]/[Q(P)]/[Q(U)] |

### 10.11.2 Reactive Power Regulation

The inverter provides reactive power regulation function. Use the "*Q-Var switch*" parameter to activate this function and select proper regulation mode.

| Regulation Mode | Explanation |
|---|---|
| *Pf* | The reactive power can be regulated by the parameter *PF (Power Factor)*. |
| *Qt* | The reactive power can be regulated by the parameter *Q-Var limits* (in %). |
| *Off* | The *PF* is limited to +1.000, and the "*Q-Var limits"* is limited to 0.0%. |
| *Q(P)* | The PF changes with the output power of the inverter. |
| *Q(U)* | The reactive power ratio changes with the grid voltage. |

#### "*Pf*" Mode

The reactive power can be regulated by the parameter *PF* on the Run-param screen.

#### "*Qt*" Mode

The reactive power can be regulated by the parameter *Q-Var limits (in %)* on the Run-param screen.

#### "*Off*" Mode

The *PF* is limited to +1.000, and the *Q-Var limit* is limited to 0.0%.

#### "*Q(P)*" Mode(when the country selection is not "IT")

The PF changes with the inverter output power.

If the country selection is not "IT" (Italy), after selecting Q(P) Mode, **Press ENTER** to enter the "Run-param" submenu.
For each item setting, **Press** ➤ to move cursor right and **Press** ⮟ to set the appropriate value. Confirm settings by Press **ENTER**.

| Run-param | |
|---|---|
| ► Upper PF Cap | 1.000 |
| Lower Power | 050.0% |
| Lower PF Ind | 0.900 |
| Upper Power | 100.0% |

**Tab. 10-5** *"Q(P)"* Mode Parameters Explanation

| Parameter | Explanation | Default | Range |
|---|---|---|---|
| *Upper PF Cap* | Power factor of point P1 in the Q(P) mode curve | 1 | 0.9…1 |
| *Lower Power** | Output power of point P1 in the Q(P) mode curve (in %) | 50% | 0%...50% |
| *Lower PF Ind* | Power factor of point P2 in the Q(P) mode curve | 0.9 | 0.9…1 |
| *Upper Power** | Output power of point P2 in the Q(P) mode curve (in %) | 100% | 50%...100% |

*Lower Power <Upper Power

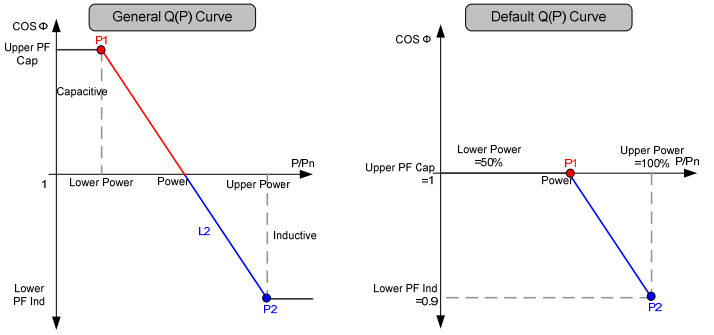
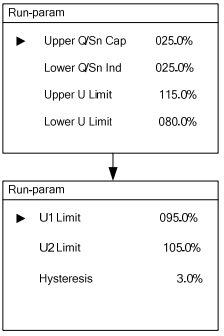



**Fig. 10-3** Reactive Power Regulation Curve in Q(P) Mode

### "*Q(U)*" Mode(when the country selection is not "AT", "VB(DE)", or "IT")

The reactive power ratio changes with the grid voltage.

If the country selection is not "AT" (Austria), "VB(DE)" (Vorarlberg), or "IT" (Italy), after selecting Q(U) mode, **Press ENTER** to enter the "Run-param" submenu. **Press ▼** to set the appropriate value.
Confirm settings by Pressing **ENTER**.




**Tab. 10-6** "Q(U)" Mode Parameters Explanation

| Parameter | Explanation | Default | Range |
|---|---|---|---|
| *Upper Q/Sn Cap* | Capacitive Q/Sn value of point P1 in the Q(U) mode curve | 25% | 0%...50% |
| *Lower Q/Sn Ind* | Inductive Q/Sn value of point P4 in the Q(U) mode curve | 25% | 0%...50% |
| *Upper U Limit* | Grid voltage limit *(in %)* of point P4 in the Q(U) mode curve | 115% | 110%...120% |
| *Lower U Limit* | Grid voltage limit *(in %)* of point P1 in the Q(U) mode curve | 80% | 80%...90% |
| *U1 Limit** | Grid voltage limit *(in %)* of point P2 in the Q(U) mode curve | 95% | 95%...100% |
| *U2 Limit** | Grid voltage limit *(in %)* of point P3 in the Q(U) mode curve | 105% | 100%...105% |
| *Hysteresis** | *Hysteresis voltage width (in %)* | 3% | 0%...5% |

*U1 Limit + Hysteresis < U2 Limit – Hysteresis

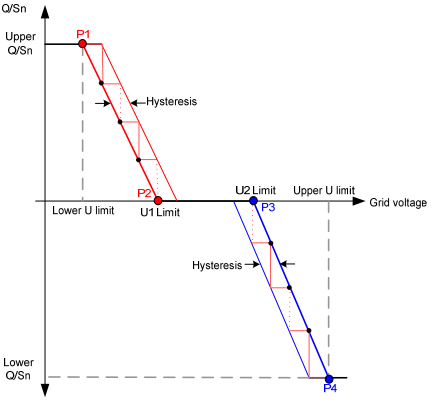
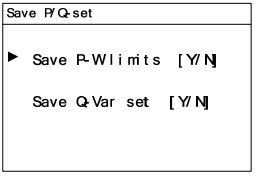



**Fig. 10-4** Reactive Power Regulation Curve in Q(U) Mode

### 10.11.3 Save P/Q-set

On the "Save P/Q-set" screen, **Press** ▼ to move arrow to one item, **Press** ➤ to move cursor right and **Press** ▼ to set.
Confirm by Pressing **ENTER**.

Select "Y" to save up the values set when power down.
Select "N" to restore default values when power down.

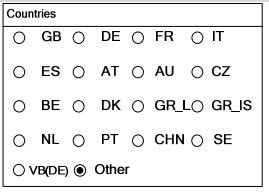



## 10.12 Setting Protective Parameters

Protective parameters are designed for the limit value that can trigger the protective functions of the inverter.

Main Screen(**Press ENTER**)→Menu screen(**Press** ▼×3)→Set-param(**Press ENTER**)→Enter password **B**(**Press ENTER**, **Press** ▼×2)→Pro-param(**Press ENTER**)

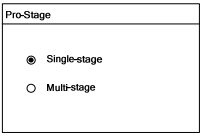
To make protective parameters setting convenient, inverter provides country code selection. Choose the correct country code by Press ▼ and Press **ENTER** to confirm.



The description of country code is illustrated below:

| Country Code | Full Name | Language |
|---|---|---|
| GB | Great Britain | English |
| DE | Germany | German |
| FR | France | French |
| IT | Italy | Italian |
| ES | Spain | English |
| AT | Austria | German |
| AU | Australia | English |
| CZ | Czech | English |
| BE | Belgium | French |
| DK | Denmark | English |
| GR_L | Greece Land | English |
| GR_IS | Greece Island | English |
| NL | Netherlands | English |
| PT | Portugal | English |
| CHN | China | Chinese |
| SE | Sweden | English |
| VB(DE) | Vorarlberg | German |
| Other | Countries not included above | English |

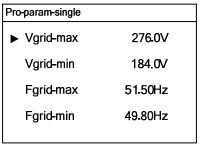
Press ▼ to select protective parameter type. Press **ENTER** to confirm the selection.




When the "Countries" DE is selected, Pro-param can be only set as Single-stage.

### Single-stage Protective Parameters (when the country selection is not "AT", "VB(DE)", or "IT")

If the selected protective parameter type is "Single-stage", the following submenu will come up.
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by Pressing **ENTER**.

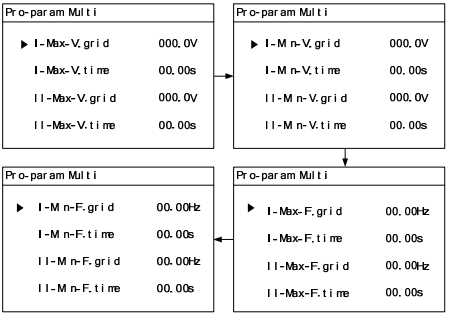


**Tab. 10-7** Single-stage Protective Parameters Explanation

| Parameter | Explanation |
|---|---|
| Vgrid-max | Over-voltage value of the grid |
| Vgrid-min | Under-voltage value of the grid |
| Fgrid-max | Over frequency value of the grid |
| Fgrid-min | Under frequency value of the grid |

### Multi-stage Protective Parameters (when the country selection is not "AT", "VB(DE)", or "IT")

If the selected protective parameter type is "Multi-stage", the following submenus will come up.
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by Pressing **ENTER**.

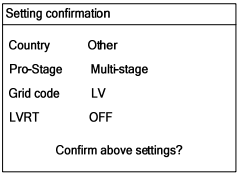



**Tab. 10-8** Multi-stage Protective Parameters Explanation

| Parameter | Explanation |
|---|---|
| **Max-V. prot** | Over-voltage protection |
| Ⅰ-Max-V. grid | Stage Ⅰ Grid over-voltage (U>) |
| Ⅰ-Max-V. time | Stage Ⅰ Grid over-voltage (U>) tripping time |
| Ⅱ-Max-V. grid | Stage Ⅱ Grid over-voltage (U>>) |
| Ⅱ-Max-V. time | Stage Ⅱ Grid over-voltage (U>>) tripping time |
| **Min-V. prot** | Under-voltage protection |
| Ⅰ-Min-V. grid | Stage Ⅰ Grid under-voltage (U<) |
| Ⅰ-Min -V. time | Stage Ⅰ Grid under-voltage (U<) tripping time |
| Ⅱ-Min -V. grid | Stage Ⅱ Grid under–voltage (U<<) |
| Ⅱ-Min -V. time | Stage Ⅱ Grid under–voltage (U<<) tripping time |
| **Max-F. prot** | Over-frequency protection |
| Ⅰ-Max-F. grid | Stage Ⅰ Grid over-frequency (f>) |
| Ⅰ-Max-F. time | Stage Ⅰ Grid over-frequency (f>) tripping time |
| Ⅱ-Max-F. grid | Stage Ⅱ Grid over-frequency (f>>) |
| Ⅱ-Max-F. time | Stage Ⅱ Grid over-frequency (f>>) tripping time |

| Parameter | Explanation |
|---|---|
| **Min-F. prot** | Under-frequency protection |
| Ⅰ-Min-F. grid | Stage Ⅰ Grid under-frequency (f<) |
| Ⅰ-Min -F. time | Stage Ⅰ Grid under-frequency (f<) tripping time |
| Ⅱ-Min -F. grid | Stage Ⅱ Grid under-frequency (f<<) |
| Ⅱ-Min -F. time | Stage Ⅱ Grid under-frequency (f<<) tripping time |

Confirm settings by pressing **ENTER** and enter the "Setting confirmation" screen.
Check all above-mentioned parameter settings. Confirm them by pressing **ENTER**. Cancel by pressing **ESC** and reset.



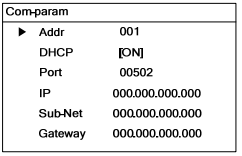

## 10.13 Setting Communication Parameters

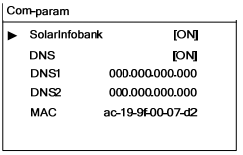
Main Screen(**Press ENTER**)→Menu screen(**Press ▼ ×3**)→Set-param(**Press ENTER**)→Enter password **B**(**Press ENTER, Press ▼×3**)→Com-param(**Press ENTER**)

**Press ➤** to move cursor right and **Press ▼** to set the appropriate value. Confirm settings by Pressing **ENTER**.

The range of communication address is 1...247.

Scroll pages by pressing **ENTER**




Apply an IP address, subnet mask, default gateway and port number for the inverter from your network administrator.

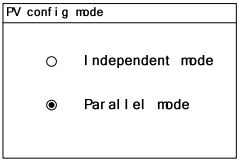
NOTICE

**If there is more than one inverter and all the inverters are set to DHCP [OFF], a unique IP address should be assigned to each inverter. The configuration procedure should be performed only by qualified personnel.**

## 10.14 Setting PV Configuration Mode

Main Screen(**Press ENTER**)→Menu screen(**Press ▼ ×3**)→Set-param(**Press ENTER**)→Enter password **B**(**Press ENTER**, **Press ▼×4**)→PV config mode(**Press ENTER**)

On the "PV config mode" screen, Press ▼ to choose PV configuration mode, Press **ENTER** to confirm the settings.




NOTICE

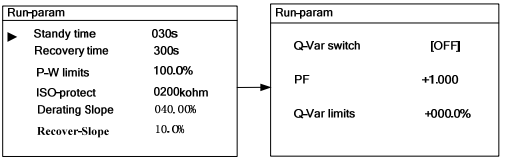
**DO NOT change the PV configuration mode when the inverter is operating.**

## 10.15 Special Settings for Austria and Vorarlberg

The differences focus on "Run-param" and "Pro-param" as shown below.

### 10.15.1 Over-frequency Setting for Austria and Vorarlberg

If the "Countries" selection is "AT" (Austria) or "VB(DE)" (Vorarlberg), the "Derating Slope" * and "Recover-Slope"* will display in the "Run-param" screen.




When the grid frequency is between 50.2 Hz and 51.5 Hz, inverter will decrease power according to the "Derating Slope".

Default derating slope (Pm/Hz, Pm is the power before derating): 40.00%. Range: 40% ...100%.

Note: "Derating Slope"* is the power derating slope.

Power derating slope = 100 / (Grid frequency × Frequency derating slope). Frequency derating slope range: 2% ...5%.

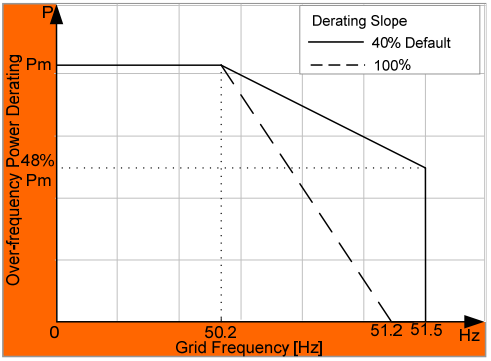



**Fig. 10-5** Over-frequency Derating Curve

Default Recover-slope: 10%. It means that the maximum starting rate of the grid power is 10%Pn/min (Pn is the rated power) after fault recovery. The range of Recover-slope is 5%...20%.

Note: "Recover-Slope"* is the power recover slope.

## 10.15.2 Reactive Power Regulation for Austria and Vorarlberg

### "Q(P)" Mode for Austria and Vorarlberg

For detailed information, please refer to "Q***(P)***" **Mode(when the country selection is not "IT"**).

### *"Q(U)"* Mode for Austria and Vorarlberg

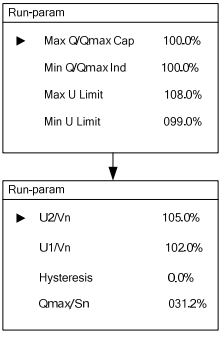
The reactive power ratio changes with the grid voltage.

Select Q(U) mode and **Press ENTER** to enter into the "Run-param" submenu.

**Press** ▼ to navigate the cursor; **Press** ➤ to enter into the editing mode, then the selected parameter will be shaded.

**Press** ▼ to increase one-step value.

**Press ENTER** to confirm the setting and exit from the editing mode.



**Tab. 10-9** *"Q(U)"* Mode Parameters Explanation

| Parameter | Explanation | Default | Range |
|---|---|---|---|
| *Upper Q/ Qmax Cap* | Capacitive Q/Qmax value of point P1 in the Q(U) mode curve | 100% | 0%...120% |
| *Lower Q/Qmax Ind* | Inductive Q/Qmax value of point P4 in the Q(U) mode curve | 100% | 0%...120% |
| *Upper U Limit* | Grid voltage limit *(in %)* of point P4 in the Q(U) mode curve | 108% | 107%...120% |
| *Lower U Limit* | Grid voltage limit *(in %)* of point P1 in the Q(U) mode curve | 99% | 80%...100% |
| *U1 Limit** | Grid voltage limit *(in %)* of point P2 in the Q(U) mode curve | 102% | 100%...104% |
| *U2 Limit** | Grid voltage limit *(in %)* of point P3 in the Q(U) mode curve | 105% | 104%...107% |
| *Hysteresis** | *Hysteresis voltage width (in %)* | 0% | 0%...5% |
| *Qmax/Sn* | Conversion between Qmax and *Sn* | 31.2% | 0%...50% |

*U1 Limit + Hysteresis < U2 Limit – Hysteresis

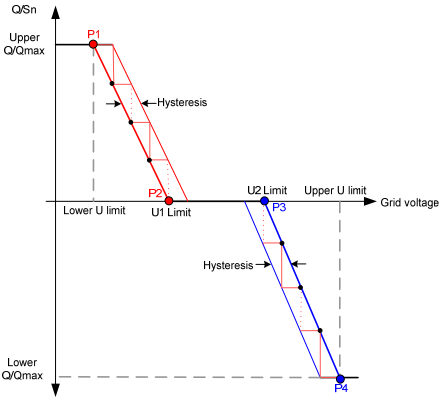


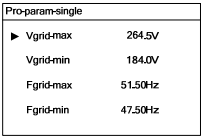

**Fig. 10-6** Reactive Power Regulation Curve in Q(U) Mode

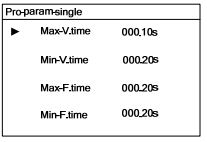
### 10.15.3 Protective Parameters Setting for Austria and Vorarlberg

If the "Countries" selection is "AT" (Austria) or "VB(DE)" (Vorarlberg), proceed as follows to set the protective parameters.

### Single-stage Protective Parameter

If the selected protective parameter is "single-stage", the following submenu will come up.
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value.
Press **ENTER** to confirm settings and scroll page.

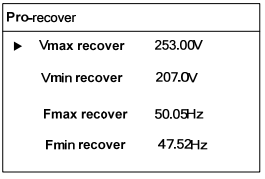



**Tab. 10-10** *Single-stage Protective Parameter Explanation*

| Parameter | Explanation | Parameter | Explanation |
|---|---|---|---|
| Vgrid-max | Grid over-voltage value | Fgrid-max | Grid over-frequency value |
| Vgrid-min | Grid under-voltage value | Fgrid-min | Grid under-frequency value |
| Max-V.time | Time of over-voltage | Max-F.time | Time of over-frequency |
| Min-V.time | Time of under-voltage | Min-F.time | Time of under-frequency |

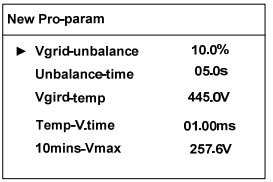
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing** **ENTER**.




**Tab. 10-11** Grid protection Recovery Value

| Parameter | Explanation |
|---|---|
| Fmax recover | Inverter can start operating only when the grid frequency is below Fmax recovery.<br>The fault recovery value when the grid over-frequency occurs. |
| Fmin recover | Inverter can start operating only when the grid frequency is above Fmin recovery.<br>The fault recovery value when the grid under-frequency occurs. |
| Vmax recover | Inverter can start operating only when the grid voltage is below Vmax recover.<br>The fault recovery value when the grid over-voltage occurs. |
| Vmin recover | Inverter can start operating only when the grid voltage is above Vmin recover.<br>The fault recovery value when the grid under-voltage occurs. |

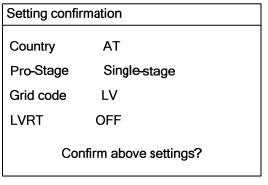
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing ENTER**.




**Tab. 10-12** New Protective Parameters Explanation

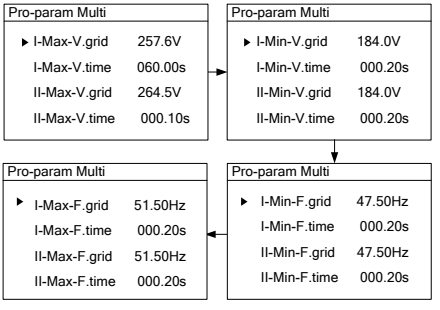
| Parameter | Explanation | Default | Range |
|---|---|---|---|
| Vgrid-unbalance | Acceptable grid-asymmetry | 10% | 5%...20% |
| Unbalance-time | Trip-time of grid-asymmetry | 5s | 1s…50s |
| Vgrid-temp | Temporary over-voltage of grid | 445V | 380V…500V |
| Temp-V.time | Trip-time of temporary over-voltage | 1ms | 0…2 ms |
| 10mins-Vmax | Over-voltage protection value of 10-min average voltage | 257.6V | 220V…299V |

Confirm settings by pressing **ENTER** and enter the "Setting confirmation" screen.
Check all above-mentioned parameter settings. Confirm them by pressing **ENTER**. Cancel by pressing **ESC** and reset.




## Multi-stage Protective Parameter

Select "Multi-stage" and **Press** ▼ to enter into the submenus.
**Press** ▼ to navigate the cursor; **Press** ➤ to enter into the editing mode, then the selected parameter will be shaded.
**Press** ▼ to increase one-step value; **Press** ➤ to decrease one-step value.
**Press ENTER** to confirm the setting and exit from the editing mode.

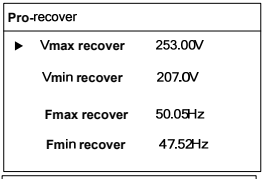



**Tab. 10-13** Multi-stage Protective Parameters Explanation

| Parameter | Explanation |
|---|---|
| **Max-V. prote** | Over-voltage protection |
| Ⅰ-Max-V. grid | Stage Ⅰ Grid over-voltage (U>) |
| Ⅰ-Max-V. time | Stage Ⅰ Grid over-voltage (U>) tripping time |

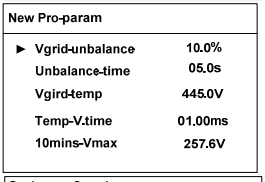
| Parameter | Explanation |
|---|---|
| Ⅱ-Max-V. grid | Stage Ⅱ Grid over-voltage (U>>) |
| Ⅱ-Max-V. time | Stage Ⅱ Grid over-voltage (U>>) tripping time |
| **Min-V. prote** | Under-voltage protection |
| Ⅰ-Min-V. grid | Stage Ⅰ Grid under-voltage (U<) |
| Ⅰ-Min -V. time | Stage Ⅰ Grid under-voltage (U<) tripping time |
| Ⅱ-Min -V. grid | Stage Ⅱ Grid under–voltage (U<<) |
| Ⅱ-Min -V. time | Stage Ⅱ Grid under–voltage (U<<) tripping time |
| **Max-F. prote** | Over-frequency protection |
| Ⅰ-Max-F. grid | Stage Ⅰ Grid over-frequency (f>) |
| Ⅰ-Max-F. time | Stage Ⅰ Grid over-frequency (f>) tripping time |
| Ⅱ-Max-F. grid | Stage Ⅱ Grid over-frequency (f>>) |
| Ⅱ-Max-F. time | Stage Ⅱ Grid over-frequency (f>>) tripping time |
| **Min-F. prote** | Under-frequency protection |
| Ⅰ-Min-F. grid | Stage Ⅰ Grid under-frequency (f<) |
| Ⅰ-Min -F. time | Stage Ⅰ Grid under-frequency (f<) tripping time |
| Ⅱ-Min -F. grid | Stage Ⅱ Grid under-frequency (f<<) |
| Ⅱ-Min -F. time | Stage Ⅱ Grid under-frequency (f<<) tripping time |

**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing ENTER**.
For the explanation of the recovery value, see **Tab. 10-11**.



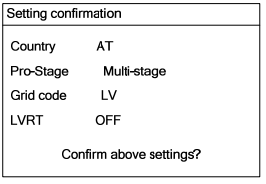

**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing ENTER**.

For the explanation of the new protective parameters, see **Tab. 10-12**.




Confirm settings by pressing **ENTER** and enter the "Setting confirmation" screen.

Check all above-mentioned parameter settings. Confirm them by pressing **ENTER**. Cancel by pressing **ESC** and reset.

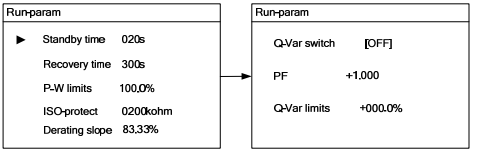


## 10.16 Special Settings for Italy

The differences focus on "Run-param" and "Pro-param" as shown below.

### 10.16.1 Over-frequency Derating Setting for Italy

If the "Countries" selection is "IT" (Italy), the "Derating Slope" will display in the "Run-param" screen.




When the grid frequency is between 50.3Hz and 51.5Hz, inverter will decrease power according to the "Derating Slope".

Default derating slope (Pm/Hz, Pm is the power before derating): 83.33%. Range: 40% ...100%.

Note: "Derating Slope"* is the power derating slope.

Power derating slope = 100 / (Grid frequency × Frequency derating slope). Frequency derating slope range: 2% ...5%.

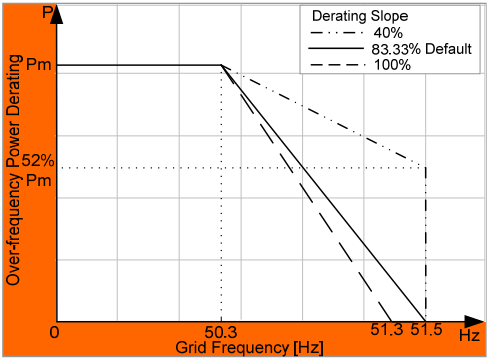



**Fig. 10-7** "IT" Over-frequency Derating Curve

## 10.16.2 Reactive Power Regulation for Italy

### Italy "Q(P)" Mode

The power factor changes with the output power of the inverter.

Select Q(P) mode and **Press ENTER** to enter into the "Run-param" submenu.

**Press** ▼ to navigate the cursor; **Press** ➤ to enter into the editing mode, then the selected parameter will be shaded.

**Press** ▼ to increase one-step value.

**Press ENTER** to confirm the setting and exit from the editing mode.

| Run-param | P3/3 |
|---|---|
| ▶ PA | 020.0% |
| PB | 050.0% |
| PC | 100.0% |
| Pf max | 0.900 |
| Uin | 105.0% |
| Uout | 100.0% |

**Tab. 10-14** Italy "*Q(P)*" Mode Parameters Explanation

| Parameter | Explanation | Default | Range | Step |
|---|---|---|---|---|
| PA* | Active power at point A *(in %)* | 20% | 20%…100% | 1% |
| PB* | Active power at point B *(in %)* | 50% | 20%…100% | 1% |
| PC* | Active power at point C *(in %)* | 100% | 20%…100% | 1% |
| Pf max | Power factor at point C | 0.9 | 0.9…1 | 0.01 |
| Uin** | Enter into the Q(P) regulation mode when the grid voltage is above Uin | 105% | 100%...110% | 1% |
| Uout** | Exit from the Q(P) regulation mode when the grid voltage is below Uout | 100% | 90%...100% | 1% |

*PA < PB≤ PC ** Uin > Uout

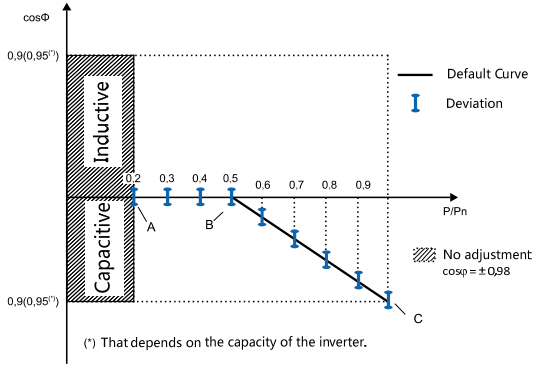



**Fig. 10-8** Reactive Power Regulation Curve in "IT" Q(P) Mode

### *Italy "Q(U)"* Mode

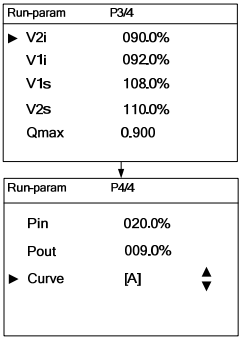
The reactive power ratio changes with the grid voltage.

Select Q(U) mode and **Press** ▼ to enter into the "Run-param" submenu.

**Press** ▼ to navigate the cursor; **Press** ➤ to enter into the editing mode, then the selected parameter will be shaded.

**Press** ▼ to increase one-step value.

**Press ENTER** to confirm the setting and exit from the editing mode.




**Tab. 10-15** Italy "*Q(U)*" Mode Parameters Explanation

| Param. | Explanation | Default | Range | Step |
|---|---|---|---|---|
| V2i* | Grid voltage at point D (in %) | 90% | 90%...110% | 1% |
| V1i* | Grid voltage at point C (in %) | 92% | 90%...110% | 1% |
| V2s* | Grid voltage at point A (in %) | 108% | 90%...110% | 1% |
| V1s* | Grid voltage at point B (in %) | 110% | 90%...110% | 1% |
| Qmax | The max. ratio of reactive power (in %) | 90% | 50%...100% | 1% |
| Pin** | Enter into the Q(U) regulation mode when the power is above Pin | 20% | 20%...100% | 1% |
| Pout** | Exit from the Q(U) regulation mode when the power is below Pout | 9% | 1%...20% | 1% |
| Curve | Curve type | A | A/B | - |

*V2i < V1i < V1s < V2s **Pin > Pout

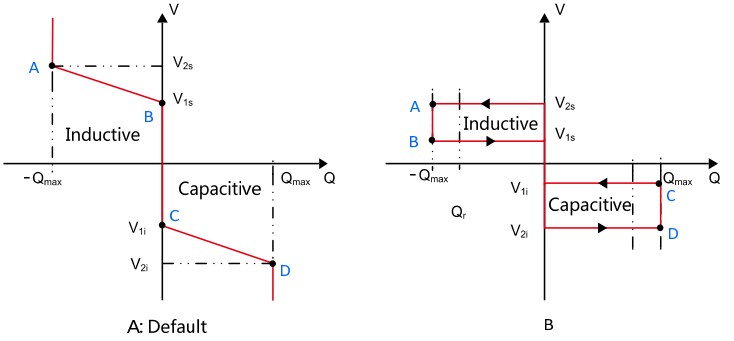


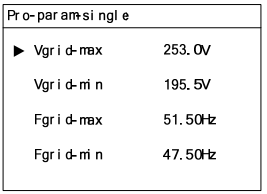

**Fig. 10-9** Reactive Power Regulation Curve in "IT" Q(U) Mode

### 10.16.3 Protective Parameters Setting for Italy

If the "Countries" selection is "IT" (Italy), proceed as follows to set the protective parameters.

#### "IT" Single-stage Protective Parameter

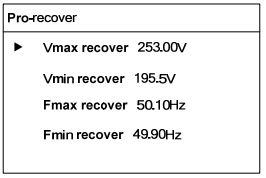
If the selected protective parameter is "Single-stage", the following submenu will come up.
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value.
Press **ENTER** to confirm settings and scroll page.




**Tab. 10-16** *Single-stage Protective Parameter Explanation*

| Parameter | Explanation | Parameter | Explanation |
|---|---|---|---|
| Vgrid-max | Grid over-voltage value | Fgrid-max | Grid over frequency value |
| Vgrid-min | Grid under-voltage value | Fgrid-min | Grid under frequency value |

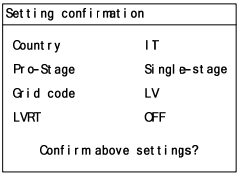
**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing** **ENTER**.




**Tab. 10-17** Italy Grid protection Recovery Value

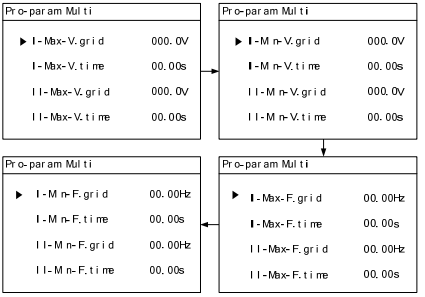
| Parameter | Explanation |
|---|---|
| Fmax recover | Inverter can start operating only when the grid frequency is below Fmax recovery.<br>The fault recovery value when the grid over-frequency occurs. |
| Fmin recover | Inverter can start operating only when the grid frequency is above Fmin recovery.<br>The fault recovery value when the grid under-frequency occurs. |
| Vmax recover | Inverter can start operating only when the grid voltage is below Vmax recover.<br>The fault recovery value when the grid over-voltage occurs. |
| Vmin recover | Inverter can start operating only when the grid voltage is above Vmin recover.<br>The fault recovery value when the grid under-voltage occurs. |

Confirm settings by pressing **ENTER** and enter the "Setting confirmation" screen.
Check all above-mentioned parameter settings. Confirm them by pressing **ENTER**. Cancel by pressing **ESC** and reset.




## "IT" Multi-stage Protective Parameter

Select "Multi-stage" and **Press** ▼ to enter into the submenus.
**Press** ▼ to navigate the cursor; **Press** ▶ to enter into the editing mode, then the selected parameter will be shaded.
**Press** ▼ to increase one-step value; **Press** ▶ to decrease one-step value.
**Press ENTER** to confirm the setting and exit from the editing mode.

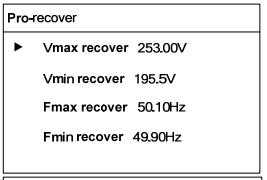



**Tab. 10-18** "IT" Multi-stage Protective Parameters Explanation

| Parameter | Explanation |
|---|---|
| **Max-V. prote** | Over-voltage protection |
| Ⅰ-Max-V. grid | Stage Ⅰ Grid over-voltage (U>) |
| Ⅰ-Max-V. time | Stage Ⅰ Grid over-voltage (U>) tripping time |
| Ⅱ-Max-V. grid | Stage Ⅱ Grid over-voltage (U>>) |
| Ⅱ-Max-V. time | Stage Ⅱ Grid over-voltage (U>>) tripping time |
| **Min-V. prote** | Under-voltage protection |
| Ⅰ-Min-V. grid | Stage Ⅰ Grid under-voltage (U<) |
| Ⅰ-Min -V. time | Stage Ⅰ Grid under-voltage (U<) tripping time |
| Ⅱ-Min -V. grid | Stage Ⅱ Grid under–voltage (U<<) |
| Ⅱ-Min -V. time | Stage Ⅱ Grid under–voltage (U<<) tripping time |
| **Max-F. prote** | Over-frequency protection |
| Ⅰ-Max-F. grid | Stage Ⅰ Grid over-frequency (f>) |
| Ⅰ-Max-F. time | Stage Ⅰ Grid over-frequency (f>) tripping time |
| Ⅱ-Max-F. grid | Stage Ⅱ Grid over-frequency (f>>) |
| Ⅱ-Max-F. time | Stage Ⅱ Grid over-frequency (f>>) tripping time |
| **Min-F. prote** | Under-frequency protection |
| Ⅰ-Min-F. grid | Stage Ⅰ Grid under-frequency (f<) |

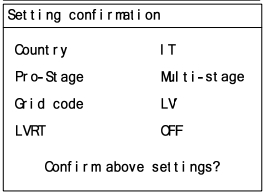
| Parameter | Explanation |
|---|---|
| Ⅰ-Min -F. time | Stage Ⅰ Grid under-frequency (f<) tripping time |
| Ⅱ-Min -F. grid | Stage Ⅱ Grid under-frequency (f<<) |
| Ⅱ-Min -F. time | Stage Ⅱ Grid under-frequency (f<<) tripping time |

**Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by **pressing** **ENTER**.




Confirm settings by pressing **ENTER** and enter the "Setting confirmation" screen.

Check all above-mentioned parameter settings. Confirm them by pressing **ENTER**. Cancel by pressing **ESC** and reset.

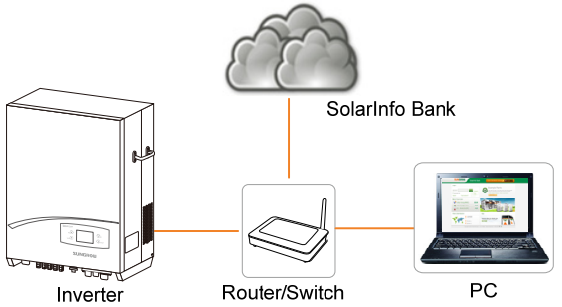


# 11 Viewing PV Plant Information

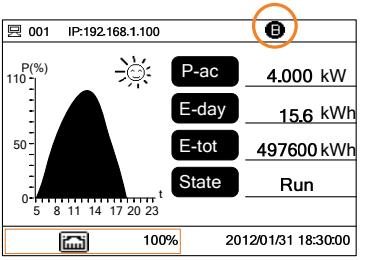
After registering on the webpage www.solarinfobank.com, user can view PV plant information through the PC or smartphone. User can also view PV plant information through the APP of SolarInfo Bank installed into the smartphone.

## 11.1 For Common User

1. Connect the communication cable between router and inverter, and connect the communication cable between router and PC.

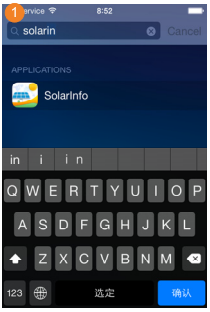



2. Wait for about 10 minutes and the icon as shown in the figure below will appear on the main LCD display interface. The SolarInfo Bank connects to the inverter successfully.

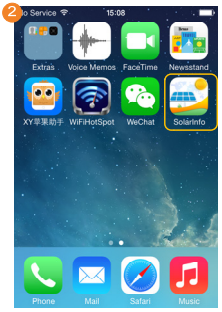



3. Open the explorer, input the webpage www.solarinfobank.com in the address bar. Register and then visit SolarInfo Bank. For details, see 11.3 Registration and Adding PV Plant.

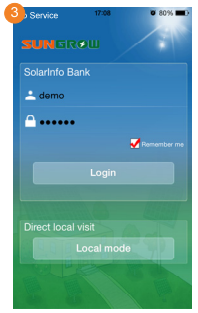
4. Search for SolarInfo Bank, download and install the APP into your smartphone. Open the APP and log in, and then you can view the plant information through the APP of SolarInfo Bank.




Search for SolarInfo Bank and install




Open SolarInfo Bank



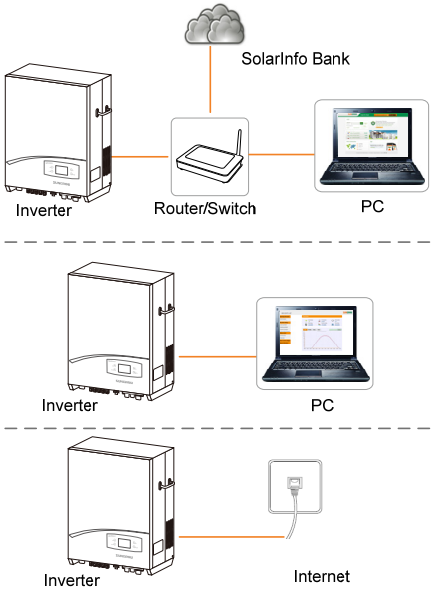

Input name and password to login

The APP of SolarInfo Bank cannot be visited in "Local Mode".

## 11.2 For Professional User

The following table shows the three scenarios of connection for professional user.

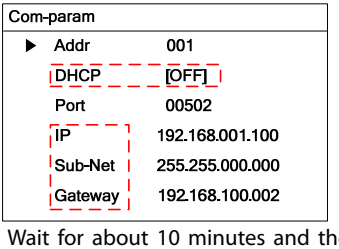
| No. | Description |
|---|---|
| Scenario 1 | The inverter is connected to router, and the router is connected to the PC. The router cannot allocate IP address automatically. |
| Scenario 2 | The inverter is connected directly to PC. |
| Scenario 3 | The inverter is connected directly to the net port. |

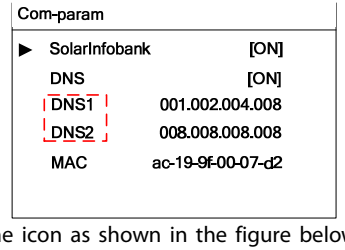



1. Connect the communication cable.
2. Set the DHCP to OFF and set the IP address, subnet mask, gateway, DNS1 and DNS2, as shown in the following figure.

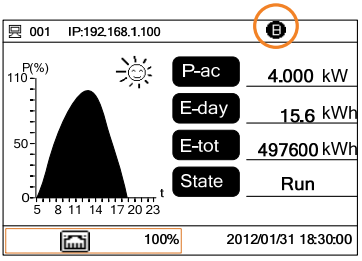
NOTICE

**Acquire the IP, subnet mask, gateway, DNS1 and DNS2 from the network professional.**




3. Wait for about 10 minutes and the icon as shown in the figure below will appear on the main LCD display interface. The SolarInfo Bank connects to the inverter successfully.




4. **(Optional)** Do this step only for scenario 2. Proceed as follows to configure the IP address and subnet mask of the computer.

– For Windows 7 or higher version, right click the [Network and Internet] icon on the right corner of the desktop, click [Network and Sharing Center], open [Local Area Connection], click [Properties], double click [Internet Protocol Version 4 (TCP/IPv4)], click [Use the following IP address].

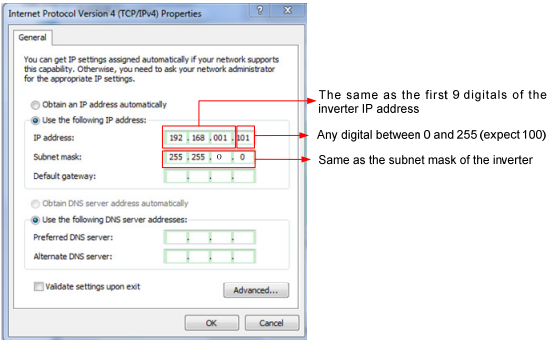
– For Windows XP, right click [My Network Places], open [Local Area Connection], click [Properties], and double click [Internet Protocol (TCP/IP), and then click [Use the following IP address].

IP address format:

- First 9 digitals of the IP address: the same as the first 9 digitals of the inverter IP address. Example: if the inverter IP address is 192.168.001.100, you must input 192.168.001 for the first 9 digitals of computer IP address.
- Last 3 digitals of the IP address: any digital between 0 and 255 (expect for the last 3 digitals of the inverter IP address), for example 101.
- So the IP address is 192.168.001.101.

Subnet mask of the computer:

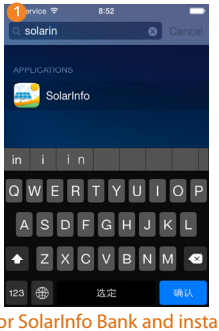
- Must be the same as that of the inverter, i.e. 255.255.000.000.


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 001 . 101
Subnet mask: 255 . 255 . 0 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel
The same as the first 9 digitals of the inverter IP address
Any digital between 0 and 255 (expect 100)
Same as the subnet mask of the inverter

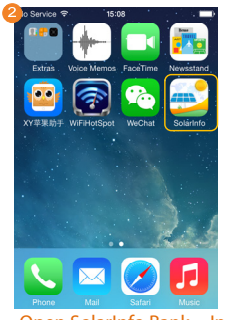
5. Open the explorer, input the inverter IP address in the address bar to enter the WebServer login interface. Input the user name and password which are **user** and **1111** respectively by default, and then press ENTER. WebServer is connected successfully.
6. Open the explorer, input the webpage www.solarinfobank.com in the address bar. Register and then visit SolarInfo Bank. For details, see "11.3 **Registration and Adding PV Plant"**.

- In scenario 1 and scenario 3, the computer can visit SolarInfo Bank only when the router can connect to the external network.
- In scenario 2, the computer cannot visit SolarInfo Bank.
- For scenario 3, contact service engineer of SUNGROW when the inverter and the PC are in different subnets.

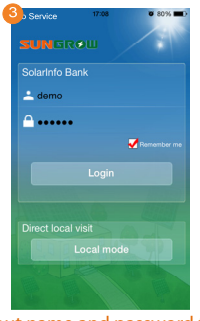
7. Search for SolarInfo Bank, download and install the APP into your smartphone. Open the APP and log in, and then you can view the plant information through the APP of SolarInfo Bank.



Search for SolarInfo Bank and install



Open SolarInfo Bank



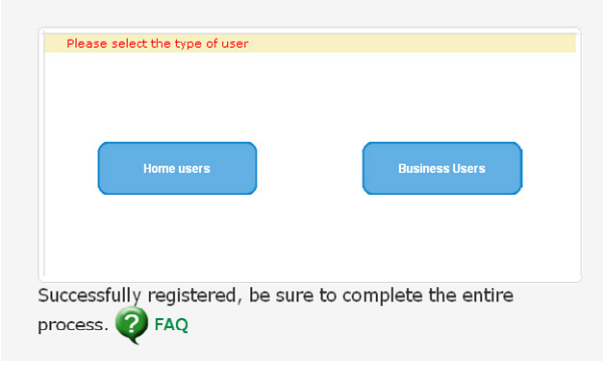
Input name and password to login

The APP of SolarInfo Bank cannot be visited in "Local Mode".

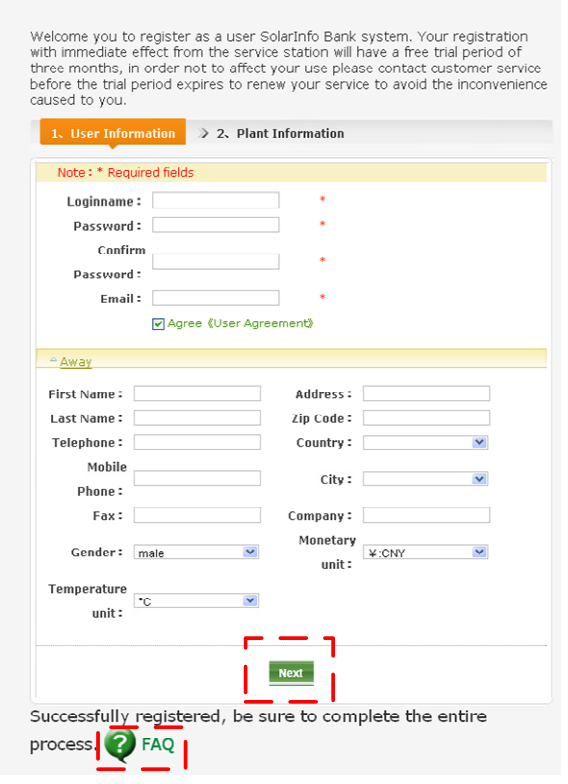
## 11.3 Registration and Adding PV Plant

1. Open a browser and enter the URL www.solarinfobank.com to view the homepage of SolarInfo Bank. Register a new user by clicking "Register".

2. The registration interface as shown below will appear .User can select Home user or Business user according to real situation. Select Home user for residential use. Select Business user for commercial use.

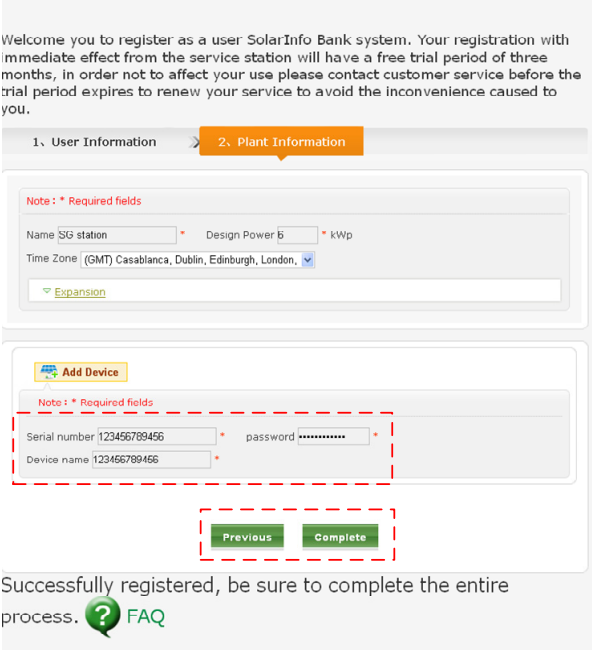

Please select the type of user
Home users
Business Users
Successfully registered, be sure to complete the entire process.
FAQ

3. Fill in user information as shown in the following figure and click Next.

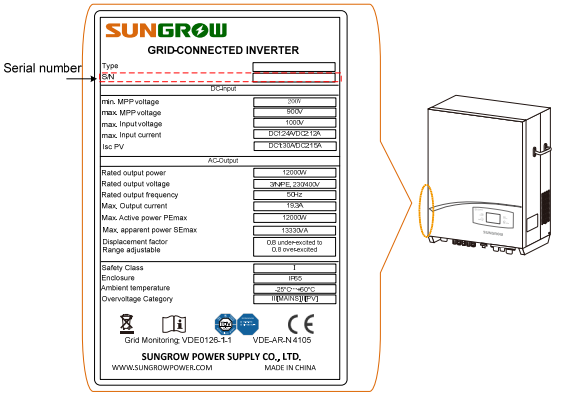

Welcome you to register as a user SolarInfo Bank system. Your registration with immediate effect from the service station will have a free trial period of three months, in order not to affect your use please contact customer service before the trial period expires to renew your service to avoid the inconvenience caused to you.
1、User Information
2、Plant Information
Note : * Required fields
Loginname :
Password :
Confirm Password :
Email :
Agree《User Agreement》
Away
First Name :
Last Name :
Telephone :
Mobile Phone :
Fax :
Gender :
male
Temperature unit :
°C
Address :
Zip Code :
Country :
City :
Company :
Monetary unit :
¥:CNY
Next
Successfully registered, be sure to complete the entire process.
FAQ

The Country, City, Monetary unit and Temperature unit can be selected from the drop-down list. For other items, user must fill in manually.

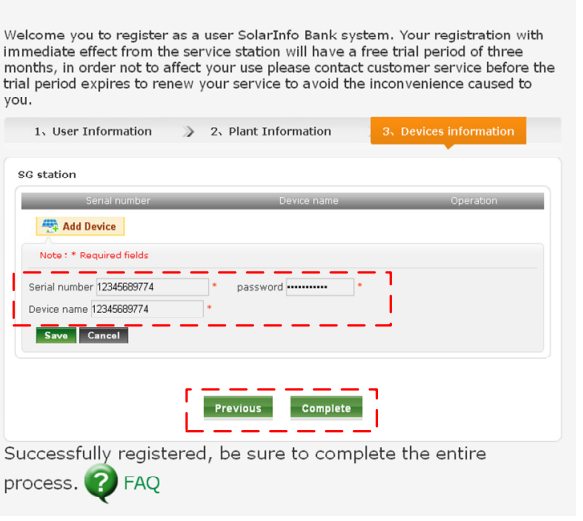
4. Enter the Plant Information interface. Click Complete to finish the registration and click Previous to return to the precious page to modify information. If the Home users is selected in step 2, the registration process is finished by now.


Welcome you to register as a user SolarInfo Bank system. Your registration with immediate effect from the service station will have a free trial period of three months, in order not to affect your use please contact customer service before the trial period expires to renew your service to avoid the inconvenience caused to you.
1、User Information
2、Plant Information
Note：* Required fields
Name SG station
Design Power 6
kWp
Time Zone (GMT) Casablanca, Dublin, Edinburgh, London,
Expansion
Add Device
Note：* Required fields
Serial number 123456789456
password
Device name 123456789456
Previous
Complete
Successfully registered, be sure to complete the entire process.
FAQ

- Time Zone must be selected according to the installation place of the inverter. If user does not know the local time zone, please check in Google Map.
- If new devices are added, please fill in the pertinent information in the following format:
  - **Serial number**: the serial number shown on the device nameplate.
  - **Password**: the same as the serial number and should be input manually.
  - **Device name**: the same as the device serial number by default and can be changed by the user.




5. Proceed as follows to fill in the Device Information if the Business users is selected in step 2.


Welcome you to register as a user SolarInfo Bank system. Your registration with immediate effect from the service station will have a free trial period of three months, in order not to affect your use please contact customer service before the trial period expires to renew your service to avoid the inconvenience caused to you.
1、User Information
2、Plant Information
3、Devices information
SG station
Serial number
Device name
Operation
Add Device
Note：* Required fields
Serial number 12345689774
password
Device name 12345689774
Save
Cancel
Previous
Complete
Successfully registered, be sure to complete the entire process.
FAQ

NOTICE

**The format of Serial number, Password, and Device name are the same as that in Step 4. Click Complete to finish the registration and click Previous to return to the precious page to modify information.**

6. Refreash the webpage www.solarinfobank.com, then you can see the data of the corresponding PV plant.

# 12 Appendix

## 12.1 Technical Data

| Parameters | SG8KTL-EC | SG10KTL-EC | SG12KTL-EC |
|---|---|---|---|
| **Input Side Data** | | | |
| Max. PV input power | 8440 W | 10550 W | 12650 W |
| Max. PV input voltage | 1000 V | | |
| Startup voltage | 250 V | | |
| Nominal input voltage | 610 V | | |
| MPP voltage range | 200...900 V | | |
| MPP voltage range for nominal power | 320...800 V | 320...800 V | 350...800 V |
| No. of MPPTs | 2 | | |
| Max. number of PV strings per MPPT ( DC1/DC2 ) | 3/1 | | |
| Max. PV input current ( DC1/DC2 ) | 33 A(22 A/11 A) | 33 A(22 A/11 A) | 36 A(24 A/12 A) |
| Max. current for input connector | 12 A | | |
| Short-circuit current of PV input ( DC1/DC2 ) | 42 A(28 A/14 A) | 42 A(28 A/14 A) | 45 A(30 A/15 A) |
| **Output Side Data** | | | |
| Nominal AC output power | 8000 W | 10000 W | 12000 W |
| Max. AC output apparent power | 8000 VA | 10526 VA | 13300 VA |
| Max. AC output current | 11.6 A | 15.3 A | 19.3 A |
| Nominal AC voltage | 3/N/PE, 230/400 Vac | | |
| AC voltage range | 310...450 Vac<br>(May vary as per corresponding country's grid standard) | | |
| Nominal grid frequency | 50 Hz | | |
| Grid frequency range | 45...55 Hz<br>(May vary as per corresponding country's grid standard) | | |
| THD | < 3 % (Nominal power) | | |
| DC current injection | <0.5% In | | |
| Power factor | >0.99 @default value at nominal power, (adj. 0.8 overexcited to 0.8 underexcited) | | |

| Parameters | SG8KTL-EC | SG10KTL-EC | SG12KTL-EC |
|---|---|---|---|
| **Protection** | | | |
| Anti-islanding protection | Yes | | |
| DC reverse connection protection | Yes | | |
| AC short circuit protection | Yes | | |
| Leakage current protection | Yes | | |
| DC switch | Integrated | | |
| DC fuse | No | | |
| Overvoltage protection | III | | |
| **System** | | | |
| Max. efficiency | 98.0% | 98.0% | 98.0% |
| Max. European efficiency | 97.5% | 97.6% | 97.5% |
| Isolation method | Transformerless | | |
| Ingress protection rating | IP65 | | |
| Night power consumption | <1 W | | |
| Operating ambient temperature range | -25℃...60℃( > 45℃ derating) | | |
| Allowable relative humidity range | 0...95%, non-condensing | | |
| Cooling method | Natural cooling | | |
| Noise | ≤29 dB | ≤29 dB | ≤35 dB |
| Max. operating altitude | 2000m | | |
| Display | Graphic LCD | | |
| Communication | 2×Ethernet, 2×RS485(RJ45 connector), 4×Digital Inputs, 2×Digital Outputs, Webserver Integrated | | |
| DC connection type | MC4 | | |
| AC connection type | Plug and play connector | | |
| Certification | VDE0126-1-1, EN62109-1, EN62109-2, G83/1, VDE-AR-N-4105, CEI 0-21 | | VDE0126-1-1, EN62109-1, EN62109-2, G59/2, VDE-AR-N-4105, CEI 0-21 |
| **Mechanical Data** | | | |
| Dimensions(W×H×D) | 535 mm×710 mm×220 mm | | |
| Mounting method | Wall bracket | | |
| Weight | 36 kg | 36 kg | 45 kg |

## 12.2 Exclusion of Liability

The content of these documents is periodically checked and revised, please contact us or check our website www.sungrowpower.com for the latest information. Discrepancies cannot be excluded. No guarantee is made for the completeness of these documents. Please contact our company or distributors to get the latest version.

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- Ignoring relevant safety regulations in the deployment location when installing or operating the product
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Installing or operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product faults due to operating attached or neighboring devices beyond allowed limit values
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- Using the SolarInfo software for commercial purposes is prohibited.
- Decompiling, decoding or destroying the original program, including SolarInfo software and the embedded software, is prohibited.

## 12.3 About Us

Sungrow power supply is a China-leading manufacturer of various power electronics products for renewable energy generation systems. Our products include converters, inverters, battery chargers and other power supplies for distributable generation system in both grid-connected and stand-alone applications. The power rating of SUNGROW products covers from hundred watt to mega-watt systems.

The vision of SUNGROW is to help our customers acquire stable and clean power with minimum cost, maximum reliability and enhanced safety.

### Contact Information

Should you have any problems about this product, please contact us through the following information. We will be more than happy to assist you!


| | |
|---|---|
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